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FOOD TECHNOLOGY

Food Technology
Sterols From Oils 86
Chloride Distribution in Vegetables ... 86

Food Engineering
New Laboratory Spray Dryer 86
For Better Heat Transfer in Refrigeration 86
How To Compare Industrial and Test Sieves 42

Beverages
Quality Control of Operations in the Beverage Plant 44

Canned and Preserved Foods
Quality of Canned Sauerkraut 88
Use of Dry Sugar in Sweetening Foods Canned in Sirup 47

Dairy Products
Browning of Evaporated Milk 89
Dearated Milk and Bitter Flavor 89
Salted Cream 89
Limburger from Pasteurized Milk 90

Frozen Foods
Frozen Poultry Storage 90
Pectin as an Aid in Freezing Fruits ... 56

Grain Products
Better Waste Disposal in Wet Milling of Corn 90

Fats and Oils
Antioxidants in Soybean Oil 91
Distearin for Margarine 91

Meats
Quality of Meat 92
Effect of Smoking on Tenderness of Canadian Bacon 92

Miscellaneous
Making Food From Grass 92
Calcium Hardening for Potatoes 92

Pickles
Progress in Processing Salt Stock 50

Special Feature
When the Bombs Fall 33
By Eric Hardy

Management
How To Cheat the Floods 35
By Gordon W. McBride
Two-way Payloads Cut Costs, Improve Quality ... 60

Production
How To Compare Industrial and Test Sieves 42
By Rudolf Kohn
Progress in Processing Salt Stock—Part II 50
By W. G. Wormley

Product Control
Quality Control of Operations in the Beverage Plant—Part II 44
By S. S. Epstein and M. Kirsch
Pectin as an Aid in Freezing Fruits 56
By Geo. L. Baker
Use of Dry Sugar in Sweetening Foods Canned in Sirup 47
By O. G. Braun, G. L. Hays, H. A. Benjamin

Packaging
Paper Can That Can Take It 54
What Europe Does To Save Tin 58
By George E. Doying, Jr.

Materials
Home-grown Flavors Replace War-blocked Imports 38
By Allen Chaffee
California Desert Becomes Date Oasis 40
By Andrew R. Boone

Markets
Your Market Is Shifting 52
By Ivan C. Miller

Every Month
Talk of the Industry 29
New Packages, Products 57
Hints and Hurdles 59
Automotive 60
The Food Industry News 63
Business Trends 71
Mens, Jobs, Companies. 75
Food Equipment News .. 78
Catalogs 85
Food Technology—Abstracts 86
Books 94
Patents 95
Formulas 99

★HOMES OF FAMOUS FOODS

On the cover this month is illustrated the large plant of Geo. A. Hormel & Co., Austin, Minn., one of the leading meat packers of the country. In this plant are produced not only fresh and cured meat products, but canned meats and the well-known Hormel canned soups.

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This Issue

YOUR MARKET IS SHIFTING

More food is now reaching consumers' stomachs via commercial and industrial restaurants and cafeterias, Army mess halls, dining cars and what not. Less is going into the stomach via the domestic kitchen. This has an important bearing on packaging, merchandising and promotion in the food industries. This change is outlined and its significance interpreted in a two-part article by Ivan C. Miller, distribution editor of FOOD INDUSTRIES. Part I appears on page 52.

DOMESTIC DISASTER

Something much closer to home than war and just as devastating may hit food factories in the river valleys of these United States soon. Floods can be expected any time from now until April. And the wise food manufacturer whose plant is located where the water may rise wants to be prepared for the emergency. If you are in this predicament you will find help in an article starting on page 35. The author of this article went through the great 1937 flood in the Ohio Valley, and so speaks from experience.

WE HOPE IT WON'T HAPPEN HERE

We are publishing an article which *we hope* will have absolutely no practical value for the food industries in America. This article is a report by an English technologist on what the air raids have done to the food industries in England, and on what happens in a food plant when Nazi raiders come over. You'll find it, except for what the censors deleted, on page 33. It will surprise you.

TIN, TIN, WHO'S GOT THE TIN?

Tin in the mines of Malaya won't make cans for American food manufacturers. And, if something doesn't happen soon to reverse the trend in ocean shipping, that tin is likely to stay right where it is now. That being the case, there may be more than academic interest in the article on page 58, which tells what European countries, now deprived of tin, are doing about food packaging. Their dodges, incidentally, may not only prove useful in the days of war-blocked ocean traffic but may foreshadow packaging practices of the future.

ONE HUNDRED PERCENT AMERICAN

All four corners of the world have contributed the flavoring materials so necessary to food manufacturers. But now shipments from many ports have ceased and reserve stocks run low. To look forward to food without flavor would be a flat and unappealing prospect. Fortunately, we are safe from such a fate. Many flavors can be homegrown and many others can be obtained from the tropical countries of the Western Hemisphere. The situation is summarized by Allen Chaffee on page 38.

Coming

HOW MUCH IS A GALLON?

Well, it all depends. And what it depends upon will be explained in an article on how to determine the volume and weight of bulk quantities of liquids. And there is much more to this than "how much is a gallon." It tells how to figure the contents of all types of tanks used in the industry. This is important not only in inventory but in process control. The author is Neal M. Carter, director, Pacific Fisheries Experimental Station, Prince Rupert, B. C.

THE PACKAGE IS ON THE SPOT

There isn't any justice. Years of development have produced food containers that protect the quality of the product, keep it sanitary until it reaches the consumer, make it more convenient to use and assure honest weight. And then what happens? Certain consumers, consumer groups and, alas, even the government, make damaging cracks about the high cost of packaging. This criticism is not justified. Why it is not will be told in an article in February by W. F. Howell, secretary, Robert Gair Co., Inc., New York. You must know the answers if you are to protect your own good will.

WHAT DO TESTS MEAN?

If you go to considerable trouble to find out how consumers react to some new product, how are you going to translate their reactions into a profitable course of action? That is the question that has caused many food manufacturers to hesitate to use consumer-preference tests as a guide in the development of new food products or flavors. However, the results of these tests can be evaluated and put to profitable use. Washington Platt of the Borden Co. has studied this problem for many years. So also have a number of other men prominently associated with the manufacture and marketing of food products. What these delvers have dug up in the fields of consumer psychology has been collected by Mr. Platt in the form of a symposium. This will be a not-to-be-missed feature in March.

WHAT TO DO WHEN SIZES VARY

Raw materials for the food plant such as potatoes, apples, cucumbers for pickles, oysters and olives, come in a great variety of sizes. It seldom pays the food manufacturer to buy these products already assorted, but they must generally be graded according to size before being sold.

How much, then, of the cost, must be assigned to each of the finished grades. The problem has long plagued the pickle manufacturers, among others. So one of them has burned some midnight oil and worked the problem out. H. S. Schucart, secretary-treasurer of Fleischman's Pickles, Inc., is the man, and he will tell the method in the March FOOD INDUSTRIES.

FOOD INDUSTRIES

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LAURENCE V. BURTON, Editor

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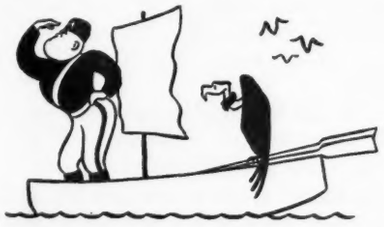
The Talk of the Industry

★ IF POLITICIANS really want to aid the farmer via the Farm Chemurgic route, let Congress repeal the tax on alcohol for industrial uses. As soon as pure alcohol can be bought for something like its true economic worth there will be plenty of uses for it. And Federal research will not be needed to locate them.



★ AN UNCENSORED LETTER recently arrived from a subscriber in Italy bore the postmark May 8, 1940. Can it be that Italian ships are that slow?

★ THE FUNCTION of production manager in a large food company may sound alluring to one who has never actually occupied such a job, but it requires remarkable physical stamina to keep going. In fact, one must be a glutton for punishment to keep up with some of them, like W. L. Campbell of Kroger Grocery & Baking Co., for example. By autumn in 1940 he had covered 46,000 miles by auto in 48 weeks while performing his daily job.

★ LOOK FOR demands for wage increases just as soon as food, clothing and housing prices begin to advance. Though the food industry may feel that it is outside the sphere of the heavy-industry boom, food-company employees will expect higher wages for exactly the same reasons that prompt the munition workers: The higher cost of living and the fact that manufacturers will have the money.

★ B. H. THURMAN calls our attention to an error in an editorial in the October, 1940, FOOD INDUSTRIES which said that he was with Durkee Famous Foods. He is now vice-president of Refining, Inc.

Sorry. We'll buy the drinks the next time we meet.

★ "An Unsatisfactory Meal" listed on page 145 "The Cook Book of the United States Navy" comprises pot roast, gravy, mashed potatoes, mixed peas and carrots, bread, butter, coffee and rice pudding. But a satisfactory meal is said to be celery soup, pot roast, gravy, mashed potatoes, baked squash, lettuce salad, bread, butter, coffee, lemon pie. If the Navy lives up to such niceties the Army had better look to its laurels.

★ HEAVY industry has only three principal customers: The Army, the Navy and the British Empire. The demands of these customers are likely to be insatiable for some years to come. It is only a matter of time before the food industry will experience a corresponding demand from the workers employed by heavy industry.

★ A FARMER at Hayward, Calif., has developed something new in egg processing. He removes stains on leghorn eggs, which you may recall should be very white, by buffing them on a power-driven buffer. Two wooden wheels are belted to a ¼-hp. motor. Around each wheel is a soft rim of sponge rubber, faced with fine emery cloth. Two operators buff off the spots on eggs in no time at all. You might call it quick cleaning.

★ MANY A YOUNG MAN will have a rare opportunity to lay the corner stone of his fortune in the next few years, provided that the country does not go totalitarian. All that he needs to do is (1) be heavily in debt for real estate or something that can't evaporate if inflation comes, and, (2) have all his cash in a safe bank if deflation comes.

★ FOR LO THESE MANY YEARS the U.S. Department of Agriculture has, by implication, seemed to consider fish as an agricultural product. Though this may appear to be an unimportant—even harmless—conceit, it cannot be passed by without comment. The Bureau of Fisheries, U.S. Department of Commerce,

should look to its laurels, for given a few more efforts like "Technology on the Farm" and the Bureau of Fisheries may find itself reshuffled into the Department of Agriculture.

If you have not seen this 224-page book, you should be informed that it is a "Special Report by an Interbureau

Committee and the Bureau of Agricultural Economics," all in the Department of Agriculture, with a foreword by H. R. Tolley, chief, Bureau of Agricultural Economics. It is for sale by the Superintendent of Documents, Washington, D. C.; price, 40 cents. (No charge for the "plug.") In thumbing through Chapter 24, devoted to preservation of foods, one finds an item on canned fish which covers salmon, tuna, shrimp and sardines. This piece is sandwiched between "fruit juices" and "cold packing."

One does not take exception to the inclusion of these four fish types as agricultural products, but it does seem to be unfair discrimination against other products that come from farms such as oyster farms, turtle farms, terrapin farms, alligator farms, gold fish farms, bass farms and poor farms.

Unfair to organized fish farming, we calls it.

Heinz Case Ruling

A BUSINESS MAN has difficulty in following the line of reasoning of the U. S. Supreme Court in the H. J. Heinz case, in which the court upheld the NLRB opinion that it could demand a written contract of an employer in collective labor bargaining after an agreement is reached. The complete absence of anything in the law on written contracts is, henceforth, no excuse for failure to sign a contract. And, once again the comment of former Attorney General Homer Cummings comes to mind:

"It would be a very naive person, indeed, who would expect to find the law in the statute books."

Why the NLRB should fail to go to Congress for a clarifying amendment to the Wagner law is, of course, apparent: Congress might conceivably clean up the whole mess and deprive CIO of its government-aided advantages over craft unions. That such legislation is needed is well known, but it is unlikely to come to pass.

The court has ruled, and hence, after all avenues of bargaining have been exhausted and an agreement has finally been reached, the employer must sign a contract if the union so demands. But is the union also bound to sign if the employer so demands? Apparently not —yet.

Picking Out the Goats

THERE is something of an ominous quality in the recent remarks of a leading financial house about what Congress might do to increase revenues to pay the cost of defense. This house suggests that:

"By all the regular standards, the ten billion bottles of carbonated soft drinks sold each year constitute an excellent new field for excise taxes, a fact which has been frequently mentioned in Washington. A rate of one cent per bottle would produce $100,000,000 and put the lowly soda pop in fourth place as an excise tax carrier."

While it is true that Congress has often slyly flirted with the idea of an excise tax on carbonated beverages, there are several erroneous ideas in the foregoing speculation. One is that sales volume at 6 cents would equal the present volume at 5 cents. Another is the equity of a *per bottle* tax.

If Henderson Doesn't Get You, Arnold Will

IT'S ALL very hush-hush, but probably true, that no price increases will be permitted by Leon Henderson during the "emergency" except in the prices of farm products, which might be taken to mean that corresponding rises in food prices may escape official censure or "smears." Optimists believe that food prices may be allowed to increase only so far as

Hors d'Oeuvres

★ 'Tis reported that Russia last month acquired heavily of American lard and coconut oil. Bear grease, or oil for the Axis?

★ *The Army boys at Ft. Sam Houston have a mechanical potato peeler and a gadget that slices the peeled spuds. Now that's military mechanization what is better than two panzer divisions in any man's army—say's one who has done KP.*

★ Said H. G. Wells after his recent visit to this country: "You have some of the loveliest wines in the world, but you don't know about them. First of all, you call them 'domestic' wines, and that's enough to start trouble anywhere." And the sad part of it all is that the wine industry itself started the trouble.

★ *The Spice Mill has applied a new dimension to the printed page. It scented the pages in the January issue with oil of cinnamon to create the atmosphere for an article on that product. Wonder what odors would be used for a three-cent evening paper?*

★ Winston Churchill prefers oysters to any other food. Hitler must live on prunes. And Muss has been swallowing a lot of hot potatoes lately.

★ *German soldiers eat soybean products, which puts lecithin into the system, which combats fatigue and minimizes the frequency of body eliminations on forced marches. The old Prussian army didn't enjoy the blessings of lecithin, which may explain how the goose-step originated.*

★ Apple-raspberry juice is the newest development in beverages. They ought to call it the Bronx-cheer cocktail.

★ *Many of the little grain elevators, creameries and canneries operate inefficiently, says the Department of Agriculture. But that's nothing to what the Department of Justice says about the big ones that do operate efficiently. Damned if and damned ifn't.*

★ On every business day in the United States 160 retail food stores go out of business and another 133 change hands. Poor merchandising, especially price cutting, says Paul S. Willis. Throat-cutting, we calls it.

★ *The U.S. Civil Service Commission wants student dietitians for the Army Medical Center in Washington. Salary, $420 a year, less $360 for subsistence and quarters and a 3½ percent retirement deduction. Looking for a position?*

★ Representative Culkin has introduced a bill outlawing the advertising of alcoholic beverages by radio. Surely he isn't afraid that the air waves will become polluted.

★ *Britain will buy about $2,000,000 worth of canned herring from British Columbia. Would this be to drag cross Hitler's trail?*

★ After the windows were blown out of a London food store by a bomb, the proprietor chalked this message on the boarded up store front: "Never mind the blasted windows, come right in."

★ *Another proprietor with blasted windows put up a "Gone With the Wind" sign. In this country he would have been mobbed.*

★ During an air raid the patrons in an English inn heard a bomb come whistling down. At that moment the innkeeper set up the glasses and said, "This one is on the house." It was—the explosion wrecked the place. But next day the innkeeper was serving beer from the cellar, with this notice on the ruins: "We are more open than ever."

★ *And we thought we had a sense of humor.*

F. K. L.

justified by higher agricultural commodity prices. Pessimists believe, however, that increased prices to farmers must come out of the already thin profit margins of the food manufacturer.

The hush-hush part is that the Department of Justice is, it is predicted, to be prevented from prosecuting those firms and industries on which the defense program depends for the indispensable material of war. Even the government realizes the incongruity of prosecuting the very concerns which are being importuned to work seven days a week on three shifts.

From the foregoing one may deduce a reasonable conclusion: Being thus deprived of an opportunity to prosecute heavy industry for real or fancied violations of the antitrust law, the Department of Justice can be expected to concentrate its attention on the one industry that is not immune—the food industry, and those who supply the food industry. And judging by reports of the recent presence of FBI investigators in the offices of several concerns in this category, the prosecution of the Philadelphia bakers is but a beginning.

One does not presume to pass judgment on the merits of the Philadelphia bakers case, but one can be sure that Thurman Arnold will try to find a happy hunting ground in the food and related industries if he can't go shooting in the munitions industry.

Freezer Storage For Army Camps

COLD STORAGE FACILITIES in 46 of the new Army camps—something very new in Army life—will have an important bearing on what type of foods will be purchased. Temperatures of 10 deg. F. and 35 to 28 deg. F. will be available. Capacity for all the perishable food for 12,500 men for four days, or 16,500 men for three days, is promised.

The Army is doing its part to be able to conserve tin if the occasion should arise.

How To Avoid Obstruction Of National Defense

YOUR GUESS is probably as good as anyone's as to what will take place in 1941, especially with respect to a possible declaration of war upon the United States. Nevertheless, the shape of many things to come is becoming rapidly discernible from the government's plans to render all possible aid to Britain. And it is matters stemming from that policy, matters that are within our own industrial sphere, that deserve our attention here. Admittedly we in the food industry have but a minor role today in shaping national policy, but we shall have a vital role to play as soon as new policies with respect to aid to Britain become more and more actualities, and especially if the United States is the object of a declaration of war.

For the moment it is the duty of the food industry to be ready for whatever demands may be placed on it. This means to be ready with plans that will permit the satisfactory use of substitutes if strategic materials are not readily available (tin, rubber, etc.); to be ready with trained replacements for men who are called to military service; to be ready with adequate supplies and inventories of raw materials that may be suddenly affected by a declaration of war; and to be ready for whatever transportation emergencies may develop. The latter deserves action, not merely planning.

The possibility of a transportation emergency must not be overlooked, despite a year-end statement from the Association of American Railroads to the effect that the railroads "are ready to meet any transportation situation, no matter what may develop." Probably that was a sincere and honest conviction on the part of the association, but ordinary common sense casts definite doubts on such a declaration of omnipotence. Two important factors appear to be omitted from the railroad year-end statement: The steady conversion of the automotive industry to the production of airplane engines and munitions, and the huge shipbuilding program which contemplates at least 200 merchant ships. To be sure, 200 ships in 1941–42 is but a fraction of the 2,500 merchant ships we constructed in World War I, yet obviously this is merely a start in that direction.

If those new ships are of the C_1, C_2 and C_3 types as specified by the U. S. Maritime Commission, it is probable that they will be used to carry U. S. goods from U. S. ports. In which case, the railroads will have much more goods to carry than in recent years. And, if the ship construction program approaches that of 1917–18 (which would occur in case we become involved in a "shooting" war), then the rail traffic will tax our resources in the extreme. In such an event, automotive transportation, always essential to the food industry, may be increasingly difficult to procure because of military demands.

For many reasons it appears to be very sound policy for all food industries to modernize their entire automotive equipment and have it ready, in the best possible condition, when things really begin to happen. The food industry, always in high gear, cannot function without automotive transportation, yet it cannot create the munitions to fight war. Its vital needs can, however, be better satisfied today than later when this nation really gets going on armaments. For the time being it is wise to place our industry in a place where our essential and continuing needs will not obstruct the national defense program.

Practically a Lot of Help

IN THE PROCESS of revising the FOOD INDUSTRIES digest of State food laws and regulations, we received the following penciled information from the Acting Commission of Agriculture of the State of Wyoming:

"No new laws. Practically no changes in regulations."

From which one may surmise that there have been practically no violations. Splendid!

Why the Army Bakes Its Own Bread

BAKERS who have hoped to sell the bread needed by Army training camps have been pained to learn that the Army can purchase bread only when it cannot make its own or when outside commercial sources can provide the bread more cheaply. When it is realized that the Army buys its flour at a little less than $0.01 per pound and can bake its bread for about $0.02 per pound there is little hope for commercial bakers to get a cut of the business.

If the cost figure surprises you, recall that the method of reckoning is quite different. Army costs include only ingredients, light and fuel. But even if the commercial baker could compete, the Army would not depend on him on account of the possibility of interruptions of supply by strikes or power failures.

Incidentally, field bread is excellent in flavor though very dense, and will keep from two to three weeks.

Unstandard "Standard" Packages

TOO MANY INDUSTRY GROUPS have failed to realize the great importance of packages of standard size made up in a series of simple multiples of ounce, quart or pound. Some of the older food industries have suffered greatly by neglect of this situation. Recently the canners have made some progress to escape from the difficulties which have beset their industry. The flour millers have,

however, been able to make but little progress in this direction despite effort extending over at least two decades. The flour problem well illustrates the complications which other divisions of the food business ought to make every effort to escape. Here is the way it works:

A "barrel" is a unit of flour weight. By State law, a barrel of flour is commonly defined as 196 lb. net. And then there are the half-barrel, the quarter-barrel, and other recognized smaller packages. But, unfortunately, the fractional units which are common in trade vary considerably. For example, seven States recognize 24.5-lb. packages and 12 other States recognize 24.0-lb. packages, with two of the latter specifying gross rather than net weight. Thus the largest common household package is not uniform in various jurisdictions.

Some people argue that this makes very little difference because in each community the customers all get accustomed to the local practice, and there is no local variation in units among the millers. But the difficulty is more fundamental than this matter of local practice. These minor variations which make little difference for one purchaser or even for one seller, do create an unfortunate impression. Lots of folks get the idea that the food manufacturers are "cutting the corners" a little bit too close for fairness.

It will not be easy for other industries to adopt standard packages. But it is much less difficult to do this before requirements get into the statute books, as they have in the case of flour packages. As each industry takes up this question, the following simple principles ought to be borne in mind: The size of the packages offered should conform with the customers' convenience and need. There should be relatively few sizes of "standard package." All processors making a common type of commodity should use the same standards. And, whenever possible, simple multiples of pounds, ounces, quarts or other units of net contents should be employed. In the case of flour, for example, it would be much more convenient for customers if the standard packages were 2, 5, 10 and 25 lb. and multiples of 25 lb.

We *are not* urging that the Millers National Federation immediately start a campaign on this. They know better than we what ought to be done about defining the flour "barrel." But we *are* urging that packagers of other goods who have not yet got themselves into the statute books should be very careful as to the units which become "standard package" in their line of merchandise.

Just lately the canners of fruits and vegetables have been struggling with standardization programs that never would have developed if there had not grown up a multitude of needless can sizes. If they had started out originally with containers for various important fruits and vegetables for 8, 12, 16, 24, 32 and other simple ounce units clearly related to volume, there would not have been the threat of Federal legislation requiring such action and changing much established industry practice. (Differences in specific gravity make it impossible to standardize can sizes on a weight basis.)

It is very much to be hoped that as new commodities develop and new packages are prepared there can be simple, understandable standards of size. The public would be better served. The public relations of the industry would benefit. And constant threat of change or criticism would be eliminated. Every trade association will do well to study these problems carefully for its industry's packages.

Miscellaneous Information

FROM TIME TO TIME inquiries arise as to the identity of certain substances known only by their trade-names. Two of European origin are given here.

Septasin: An organic substance sometimes used as an antioxidant. Composition is p—benzylaminobenzenesulphonamide.

Palsgaard's Emulsion Oil: An aid to emulsification used in European margarine manufacture. It consists of 1 part of oxidized soybean oil and 2 parts of peanut oil. Generally it is used in amounts of 1 percent or less.

As others are located they will be brought to your attention.

What Vitamin Flour May Do To Us

FAR-REACHING EFFECTS of the decision of the flour milling industry to promote "Vimin" flour, a vitamin B and mineral flour, can be anticipated.

Improved general public health and vigor can, of course, be expected. But what other byproducts of improved national nutrition are possible, provided the general public accepts this new flour? Efforts to popularize whole-wheat flour, containing naturally the desired nutrition aids, have failed dismally.

If one is optimistic, he can hope for greater intellectual activity, which presumably will lead to a higher degree of civilization. Also there is a faint basis for a hope that at least some of our digestive disorders will be less frequent. Perhaps they will practically disappear from persons who are fortunate enough to eat optimum amounts of vitamin B and minerals.

There may be social and economic repercussions as well. If certain types of shiftless people are that way merely because of insufficient vitamins, then they can be expected slowly to develop new energy, new ambitions, and make something of themselves.

By far the greatest effect will be on the consumption of wheat, for in this new turn of affairs is, perhaps, to be found the long sought touchstone that will tend to restore bread consumption to something like its former per capita levels.

If it should turn out this way, then food manufacturers, other than millers and bakers, will face greater competition for a place on the great American dinner table.

To meet this new anticipated competition there are two general approaches: (1) To add the vitamin B's to other foods; (2) to make the other foods so palatable that they will hold their relative consumption. A combination of the two would be the ideal.

Yet, it must be recognized that it all depends on whether or not the public actively goes after the new "Vimin" products made from flour to which have been added vitamin B_1 and calcium particularly, possibly vitamins B_2, B_6 and iron also, when present technical and economic obstacles are overcome. Smart bakers might conceivably develop products that taste a little better—even noticeably better—than their normal products, using "Vimin" flour in order to have a real tangible selling point. Thiamin chloride (vitamin B_1), riboflavin (vitamin B_2), nicotinic acid (vitamin B_6) and calcium are presumed to have no affect on flavor; quite likely the added iron will not either. Bakers who do not seize the opportunity to do a constructive merchandising job, will have missed a big bet.

How Much to Spend On Research

INDUSTRIAL FIRMS should spend 2 percent of their gross incomes for research if the ideal is to be attained, according to W. A. Hamor of Mellon Institute. In this country there are ten concerns (not food) that invest 10 percent of their gross income in research and development.

Question: How much should a food manufacturer spend? Well, how would ½ of 1 percent do for a starter? With such a continuing activity in soundly conceived research, the burden on this basis would not be excessive while the rewards might be very great.

When the Bombs Fall

British Combine

What bombs have done to Britain's food industry. What happens in a food factory during air raids

By ERIC HARDY,
somewhere in England.

DIRECT hits by high explosives were made in two different air raids on one of the biggest milk bottling plants outside of London. And as a member of the owning body I paid a visit to the spot. The 250,000 customers of this plant were inconvenienced with reduced and delayed supplies only on the morning following each raid. The damage was repaired with amazing speed. The delivery trucks, which were flung about the road like ninepins by the bombs, were replaced with hastily commissioned furniture vans, haulage trucks and anything on wheels plying for hire. I saw the plant working again before the bomb craters could be filled in—before the bricks could be cleared from much of the wrecked end of the plant—before the firemen could pump away the water from the burst mains. Luckily, there was no fire.

This incident shows how industry is less at the mercy of the bombers than you may believe.

Another instance of the effect of air raids on the food industries was described to me one morning just after the battle of Dunkirk, by one of our biggest biscuit manufacturers who remarked: "We should have been working full pitch today on a new government order for . . . tons, but we are waiting for the flour."

One day my business took me to one of our big candy manufacturing works. I found that all the windows had been blown out during an air raid on the town in the early hours of the same morning. A few houses had been leveled flat in the district, and part of the works' wall was missing. But apart from the glaziers putting in new windows, work was proceeding as usual without the slightest drop in production.

Actually, the food manufacturing industry in this country has not been seriously damaged by the air raids. The availability of raw materials, the prohibition of iced cakes and cream buns, the standard "pooling" of all brands of butter, the rising costs, the excessive profits tax and the probable purchase tax have affected it far more than any air raids. Fortunately, the big food plants are not in the region of London that has received the vent of German temper, but elsewhere in the country production has been maintained with a number of special adaptations. Planning for post-war recovery, our food industry is continuing to export biscuits and so forth under a government policy to capture the enemy's markets—not yours. The government sees that the export industry lacks nothing in supplies.

Most of the serious air raids have been at night, and unlike the armament industries, the food manufacturers (apart from bakers) are not doing so much night work. The majority of their workers are females among whom one might naturally expect panic. There might have been a bit of this in the first air raids last winter, when work was stopped and every one went to the basement

British Combine

At top of page—Heinkel bomber releases its destructive cargo. Immediately above—Hit by bombs, this food warehouse in England is ablaze.

shelters. But factories no longer adopt that view. No one is compelled to work during a raid, but in almost every factory I know about production continues without interruption. This is how they do it.

The big works have their own staff watchers in concrete pill-boxes on the works roof. In any district the air raid warning is sounded by the fighter command. A preliminary . . . (censored) warning to A.R.P. depots tells that raiders are in an adjoining area, and A.R.P. workers are called to their posts. A . . . (censored) warning shows the raiders are heading this way, so the sirens are sounded in a minute-long spell of rising and falling wails. When the raiders have passed, a two-minute, continuous, high-pitched siren sounds the "all clear." When they are completely out of the adjoining districts a . . . (censored) to A.R.P. centers lets the part-time wardens return to normal duties.

Now, the factory workers take no notice of the sirens; the raid may be in the next town ten miles away, or the plane may be on a reconnaissance flight. The watcher on the roof keeps a lookout until the bombers are actually heading for the factory, and then the works sounds its own internal alarm and the staff proceeds to basement shelters. With this system production is maintained with as few breaks as possible. Most of the heavy equipment of the factories, like mills, machinery, ovens, and so forth, is in the basements. These have had their windows well sandbagged, and there's generally a reinforced concrete floor above. So the men usually keep working until a bomb puts them out of action, which is rare. This policy has arisen from an obvious discovery in raids that bombs are dropped indiscriminately to create panic or fear among residential and rural districts, and that factories, docks, and so forth, are not singled out as the sole targets. The factory is in little more danger than the domestic house.

Of course, foodstuffs may sometimes be spoiled, especially the more delicate confections. But if burned cake is renamed "siren cake" or "Berlin bun" it sells better.

The problem of food production arising out of the air raids is mainly one of lack of sleep among factory hands who have spent most of the night in their family shelter at the bottom of the garden. Enemy raids are spread over a period of four or six hours, in which successive waves of planes go so high over a town that antiaircraft guns and searchlights have little chance, and bombs are dropped indiscriminately. To overcome the tendency towards lax periods of work, there is a national policy of "music while you work" in almost every factory. Half an hour every morning and half an hour every afternoon the government broadcasts a program of light music, and the loudspeakers broadcast it through the factory. The girls sing as they work. The men hum the popular tunes. And production is increased in what were previously slack periods—10:30 to 11 a.m. and 3 to 3:30 p.m. It's just a touch of practical psychology to overcome boredom in routine jobs. We began this war, as in the last one, with a policy of mass production by going hell for leather at it, chin out, 10 or 12 hours a day, seven days a week. But after a while production actually decreased, as was to be expected. Some works have the American system of 10-minute breaks morning and afternoon, when tea or smokes are taken by the hands. Some big works have free artificial-sunlight treatment for workers.

No One Goes Hungry

One point to remember is that the food policy of this country has been a complete success in the hands of Lord Woolton (the minister of food). By careful rationing there has been built up an ample reserve. We started the war by taking a census of the population and building up a food reserve on this basis. The war took an unexpected turn and we now have in this country the Free French, Dutch, Czech, Norwegian and Polish governments, with Polish, Norwegian, French and Czech armies, as well as thousands of European refugees, our Channel Islanders and many Canadian, Australian, New Zealand and Indian troops who were not expected when the war started. We have the biggest population ever in our history. In addition we have lost the valuable raw food production sources of the Channel Islands, France, the Low Countries and Denmark. And yet our reserves have stood up to the demand so well that nobody starves, or misses more than a few luxuries. The only malnutrition is from prewar social conditions in the big towns due to the political policy of our Victorian ancestors, which we are happily now avoiding.

But the point which most foreigners overlook is that the main problem in this country is not feeding the populace, but feeding the farm stock. When this nation became such a vast importing country we ceased to produce much of our own fodder. We still have to import vast amounts of cattle food. We have had to cut down our record dairy herds and almost halve our great poultry and pig populations, owing to the difficulties of providing foodstuffs for our great prewar farm stock.

Finally there is the human element in all this unfortunate and unnecessary war. What happens in a factory during an air raid? Of course, from a national point of view, it is important that production go on as I have mentioned and the after effects are counterbalanced as I have described. But of particular interest is the voluntary way in which members of the well-organized A.R.P. change from the daily round to new duties as soon as the sirens wail out in their horrible voices. An overseer slips a gas mask over her apron, replaces her flour cap with a "tin" helmet. The boilerman hands his shovel to his mate, pulls on his rubber boots, straps his hatchet to his belt and strides off to the fire depot. Suddenly there is a noise like a distant cry in the sky, getting louder and louder, nearer and nearer. People not in their shelters lie flat. The screaming bomb seems just overhead. The great crash comes perhaps half a mile away. Nobody screams. Suddenly a wall of flame like the corona of the sun lights up the whole horizon. A small working-class villa across town has taken the brunt of a heavy oil bomb. The manager's limousine draws out of the works shed. It is no longer a family car. Ladders are above its sunshine roof; a grey two-wheel trailer pump loaded with hose follows behind it. On the cushions of the car sit the boilerman-now-fireman, and a couple more. The great blaze goes on. People watch it and wring their hands. In a few minutes —two or three—the red flames die out of the sky as if a giant had snuffed them. Only black smoke remains. Then that goes. The crackling of burning wood and the roaring of wind-fanned flames die back to a deathly silence.

Often raiders are droning overhead and bombs are falling, but the factory hands continue their duty as firemen, wardens, nurses or whatever be their charge. Each shelter has a woman nurse trained in first-aid in charge, each department a head warden, each works a casualty center.

I've seen all this done during the raids. The war is carried to our doorsteps, but the people at home have shown their mettle.

This country is not waiting for America to fight the war. But it does want all the planes, all the raw material, all the merchant ships, all the ammunition America can provide to enable this country to fight the war for America and every other nation which has a common front of good will, good counsel and good conduct.

How to CHEAT the FLOODS

Flood waters sweep past the plant of Hook-Aston Milling Co., Zanesville, Ohio, in spring of 1937.

Ways to minimize damage if and when spring floods threaten your plant. And what to do when the water recedes. Planned action important

By GORDON W. McBRIDE, *Chemical Engineer, Washington, D. C.*

WHEN the river is at flood stage and still rising and the Weather Bureau says "continued rain tonight and tomorrow," it's time to apply some of Noah's technics. A modernized conception of what to do when the waters rise is presented here.

The plan outlined is for defense against a slowly rising flood, for which preparations may be made over several days. If the plant is located on a small stream or in a valley with only a narrow flood plain, preparations may have to be made in a matter of hours. A condensed plan should be drawn up for such a plant, based on this broad comprehensive outline, but so based that it can be executed on short notice in a minimum of time.

Flood activities may arbitrarily be divided into three classifications: Advance preparation, crest activity and "renormalization."

Advance Preparation

If your plant is in a flood zone like the Ohio or Mississippi valleys, talk with the U. S. Weather Bureau men before a flood threatens. They have had considerable experience in predicting the crest height of floods. Where a matter of a few inches may make a difference, getting the official forecast can be speeded up by intimate acquaintance at the Weather Bureau. For example, in time of flood, a man from your plant might be stationed at the Bureau to phone each calculation as it is made. By this means, radio or newspaper forecasts may be anticipated by a matter of hours. These official forecasts may need to be supplemented by hourly reports from company observers stationed a few miles upstream from the plant. And the effect of local rainfall must be considered in addition to the regional fall, for sudden rise of a small tributary may be just as damaging as the slow rise of the main stream.

Building protection is, of course, the first thought when the water threatens. Sandbags in doorways and low windows will very effectively take care of a few feet of water. Pumps and steam siphons should be rigged up for handling seepage into basements. Sewers should be supplied with flood gates to prevent backing up of water through lines of normal drainage. If the plant is located on porous ground much trouble may be experienced from seepage through the soil itself.

Perishable equipment should be moved as an elementary precaution. Motors, starting boxes, recording and indicating instruments, and storage batteries are examples. Large pieces of machinery like bottling and packaging equipment and machineshop tools should be given liberal coatings of heavy grease to prevent water damage.

Furnaces and ovens should be cooled well in advance of flooding. Vents should be extended on underground fuel tanks. Since many floods occur in winter, coils and closed equipment should be drained and pipes opened to eliminate danger of freezing when buildings get cold. All manufacturing processes should be brought to as orderly a stop as possible to avoid injury to the product.

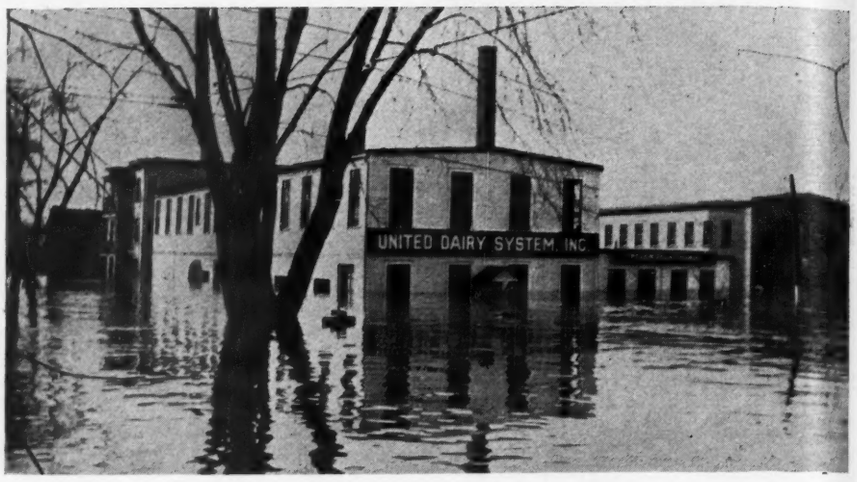
Tanks

Tanks which are in the flood zone require careful treatment. If they are empty either of two procedures is recommended: (1) They may be filled with water to the level of an open manhole, or (2) the bottom may be opened so the

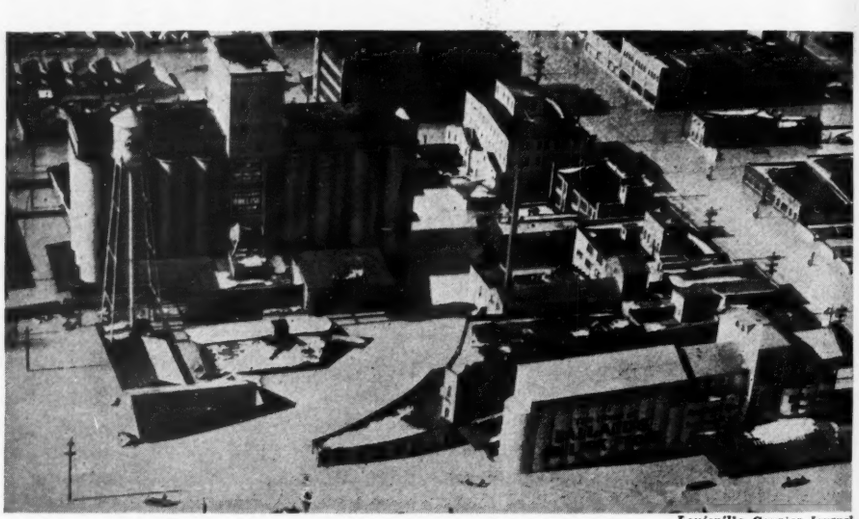
rising flood water will fill them automatically. If the latter course is chosen, care must be taken to open the tanks at the very bottom, or not more than an inch or two above the bottom. An empty tank will float in a very few inches of water and, once afloat, considerable work may be necessary to guide the tank back to its proper foundation.

Tanks which are partially filled may, if time permits, be held down by pumping in more of their normal contents, or water may be pumped in if the tank contents are not seriously damaged by such action. The separation problem can be dealt with after the flood has receded. If it is not possible to pump more liquid into the tanks, the piping may be disconnected and the tank allowed to float as the flood waters rise. Anchor lines should then be used, but only with constant supervision.

Consideration must also be given to pieces of equipment which resemble tanks in that they will float if the water gets high enough. Even tubular boilers have been known to be damaged by floating. The moral is, provide a vent of some sort so air will not be trapped under a closed shell of any kind. This will permit the rising flood waters to fill the shell, whatever it is, rather than to lift it. Compressed-gas cylinders, such as those containing carbon dioxide, will float and are heavy enough to do considerable damage if their movements are unrestricted. Moving these cylinders to a safe place before the flood is decidedly the wiser precaution.



Water stood 10 ft. deep around the plant of United Dairy System, Inc., Springfield, Mass., in the spring of 1936.



Louisville Courier-Journal

The big plant of Ballard & Ballard Co., Louisville, Ky., was surrounded by several feet of water at the height of the flood in 1937.

Plant Energy Supply

Electric power and low-pressure steam should be maintained at all costs. If the powerhouse cannot be sufficiently protected by sandbags, coffer dams and siphons, provision should be made for another source of steam if possible. A railroad locomotive or a stationary engine can sometimes fill the bill more than adequately under such conditions. Steam maintenance is particularly important to prevent freezing if the flood occurs during winter months. Incidentally, a steam-driven boiler feed pump will operate under water.

If electric power depends upon high-pressure steam, a substitute power generation system may be connected with a gas engine as a prime mover.[1] In some cases a temporary arrangement may be made to purchase power from an outside nearby source. Perhaps a motor-generator set, powered from an outside supply of electricity, may temporarily be adequate for the plant electricity needed, especially for emergency lights.

Fire protection requires special consideration. A temporary "fire boat" may be invaluable. The equipment can be transferred later to a truck if normal city and plant fire protection is not immediately restored. An amphibian arrangement might even better serve if part of the plant is under water and part still on dry land.

Stores

Raw materials in storage must be considered from a number of angles. The replacement time of any given raw material must be weighed against its actual money value. Occasionally a low-unit-cost material may not be quickly replaceable, resulting in greater overall loss if a long hold-up in production is necessary. Labels and shipping cartons fall in this class also.

Finished products in the warehouse should be moved from basements first, of course. They should be shipped if possible, or stored on any higher ground readily available. If storage within the plant is necessary, warehouse conveyors may be reversed and products stored on the upper floors of the manufacturing buildings. Here again the replacement time must be considered. Product demand and good will must be weighed against money value. If time and conditions permit, the warehouse should be protected like the power plant.

Offices

Office equipment on the lower floors of all threatened buildings demands urgent consideration. Records, files and safe contents should be moved at the very first. Such equipment as typewriters, calculating machines and other portable office machinery should be kept out of water. If time and space permit, furniture should be moved to upper floors, or it may be stacked on water-filled drums. The telephone switchboard should be raised in a similar manner. Needless to say, temporary quarters for the office staff should be found in or near the plant.

Emergency reorganization of the per-

sonnel should be on a 24-hour basis. Flood-fighting and clean-up supplies should be procured as quickly as possible, preferably in advance of the flood. Such items as rubber boots, brooms, squeegees, flashlights and batteries, oil lanterns, fire extinguishers, boats and life preservers are essential. The plant carpenter shop can helpfully supplement the available supply of boats with crude barges and rafts, using the nearest high ground for the "ship yards."

Crest Activities

Crest activities may be a matter of more than a week's routine, as in the case of the Ohio River flood of 1937, or they may be of almost negligible duration. Plant protection is vital, of course, however long the crest lasts. Strict fire regulations must be imposed, and special watchmen should be detailed to each flooded building.

If possible, shipments should be maintained to fill orders. Stock should, of course, be taken from temporary storage locations first. Extra inspection is advisable for the special handling necessary in such a time to prevent substandard goods from going out unnecessarily.

Plans for clean-up and salvage should be laid out during the crest period. Electricity, gas, water and fire protection should be restored as soon as possible, connecting to various departments of the plant in order of urgency. Mechanical and electrical repairs must be anticipated. Sanitation and health precautions must always be maintained. Building and equipment clean-up and repainting will be necessary, and damaged products must be reclaimed or destroyed. Extra inspection on the finished product should be planned for the start-up of the plant.

During the flood crest, food and first-aid must be available on a 24-hour basis. Coffee, soup and hot stew are the standbys of the "commissary" department. Drinking water may have to be imported. Typhoid innoculation or pills and boiling of all drinking water are strongly recommended. And emphasis should be placed on the importance of thorough washing before eating. Washing both hands and face with soap and water, followed by a chlorinated water rinse, has been found effective in preventing the outbreak of flood-born diseases.

"Renormalization"

In some cases, production may be resumed while water is still in the buildings. Ferry service to the upper floors may be necessary. And a temporary powerhouse on a raft may be needed for the most urgent start-up. Within the limits of the Fair Labor Standards Act, overtime operation can be scheduled for employees to earn a little extra to offset any loss occasioned by the shut-down.

Flood experience has shown that it requires about a week to restore a department to an operating condition after the water actually leaves. Complete "renormalization" of the plant, however, may be a long-time problem even though the flood be short-lived. Streets, buildings and sidewalks must be hosed and brushed. Inside walls of buildings must be washed with soap and water, preferably followed by a chlorinated water rinse. Wooden floors will almost surely need immediate repair or replacement. On the other hand, painting of buildings and equipment can be done on a leisurely schedule after production is going smoothly.

Tanks should be guided onto their foundations as the water drops. If the flood recedes so fast that the tanks may not all be guided onto their foundations properly, they may be diked and refloated into position later.

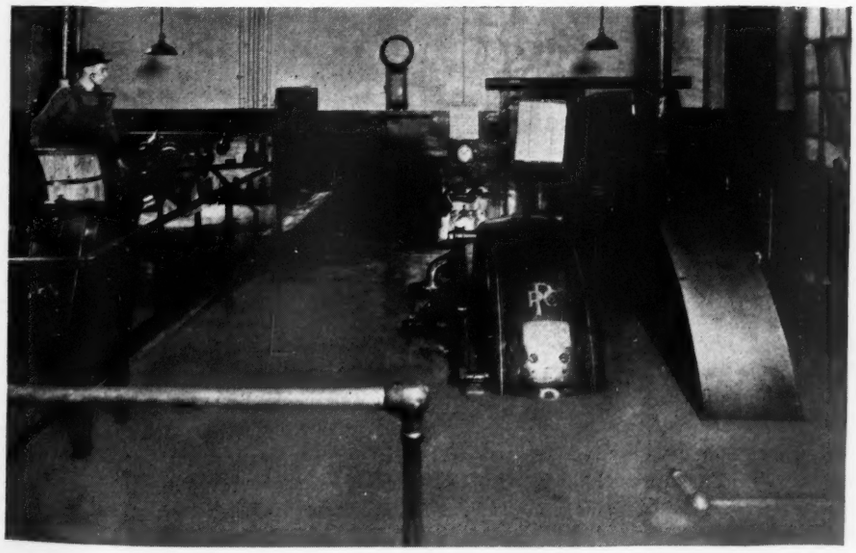
Machinery must be cleaned and oiled.[2] Rearrangement of the production equipment while reconditioning it should be considered at this opportune moment. Electrical equipment must be cleaned and oven-dried.[3,4] Conduits may be dried with hot air, or perhaps rewired to advantage after flushing and swabbing. Electrical circuits must be tested for shorts.

Drinking water supplies should be restored with care. The pipes should be flushed with chlorinated water, and bacteriological analyses should be run on the drinking water before permitting the use of fountains.

Flood damaged office furniture can frequently be repaired in the plant carpenter shop. Soaked files and papers may be dried by a photographer's print-drying drum, or on domestic mangles. Although papers are stained and wrinkled, legibility may still be good.

Salvage of manufactured goods may or may not be possible. When a warehouse full of foods packed in cans or glass has been flood damaged, cleaning, relabeling and repacking of the containers is comparatively simple.[5] However, if the food is packed only in boxes or cartons, no attempt should be made to salvage any that has been wet with flood water.

An inventory of the loss, damage and reclaim should be made. Finally, an accounting may be made to see how much the flood cost. It will not be a pleasing figure! But if precautions were well planned in advance and executed promptly when necessary, the cost will be less than if only haphazard measures were taken after the flood began.



A 66-kva. generator (extreme left) and a 132-kva. machine in the power plant of Peters Packing Co., McKeesport, Pa., were put out of operation by the flood in 1936. After the water receded, heat was applied to "bake out" the windings. The smaller generator was operating again after 15 hours.

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Home-grown Flavors Replace War-blocked Imports

Essential oil and flavor importers, with only small reserve stocks, unable to get more from blockaded countries, turn to products grown in Western Hemisphere. The change affects many food industries

By ALLEN CHAFFEE, *New York, N. Y.*

MOST of the essential oils and many of the flavors used in American food industries have been coming from abroad. Shipments from some of the most productive areas have been cut off by the British blockade and the American neutrality law. However, a most encouraging list of flavors can be obtained in the Western Hemisphere, many of them in the United States. Also, some are still available from the Far East, as pointed out by A. H. Downey of Magnus, Mabee & Reynard.

One trouble is that there are not enough steamers, and what there are move slowly. H. P. Wesemann of Fritzsche Bros. estimates that steamers are now only 40 percent efficient, and two and one-half times the tonnage is needed to transport a given amount of freight.

Thus, while there has been no shortage of nutmegs from the Dutch East Indies, the increasing difficulty of getting what there are has naturally been reflected in higher prices. Insurance rates and freight rates are higher and the free movement of steamers is handicapped. It takes longer to get clearance papers, so that steamers are held up longer at loading ports. Should shortage of Far Eastern nutmegs occur, those from the West Indies could be used for essential-oil manufacture.

Already many spice oils and flavoring extracts are made in the United States, including oil of clove and oil of nutmeg. But there is no telling how long the supply of cloves, which come from Zanzibar, will hold out.

"So far, we are getting along all right," says Mr. Downey, "but it is a big question as to how long that will continue to be so. Dry sage has gone up tremendously; and while the average firm has a certain amount of reserves, it also has contracts to fill. Now the essential oil can be purchased advantageously only immediately before the crop is picked. Then it is not delivered and paid for all at once, but so many pounds each shipment, and the successive small shipments have been cut off. That *may* mean an entire crop will later be dumped on us all of a sudden. If so, prices will of course come tumbling down."

Where Vanilla Stands

Some 300 tons of vanilla beans formerly came to us each year from Madagascar and the islands east of Africa. Shipments from these areas are now blocked. Nor are there sufficient reserves on hand to supply home needs or for re-export in manufactured goods. The war has caught most importers with little or no stocks in reserve, I am told.

However, the situation is not as bad as one might be led to think, because there are quantities of Mexican beans available. And by another year the Mexican crop should be even larger. I have it on good authority that the reason why Mexican vanilla has heretofore been less widely used is simply because it commands a higher price.

Vanilla prices are now high and may go higher, but importers see no need for such a market flurry as occurred during World War I. They point out that sometimes only 2 oz. of a flavor need be used in 100 lb. of product, and a rise in the price of the flavoring need not affect the cost of the product. Indeed, 300 tons of vanilla beans will yield an amazing number of drops of extract.

"In these days of crises," Mr. Wesemann points out, "prices are of secondary importance; and where a specialty depends upon a specific flavor, the manufacturer does not wish to change his formula. That food industry is fortunate that has several years' supply of its special flavoring materials on hand. Certain raw materials, it is true, cannot be obtained here; but aside from that, the American chemical industries are well equipped to supply the bulk of whatever is needed."

This year, Mexican curers began cutting two months ahead of time, in early January, and will have around 200,000 lb. of whole vanilla beans and 235,000 lb. of cut beans to meet the demand. That is encouraging, as far as it goes. But in 1938, the United States consumed 1,020,000 lb. and in 1939 used 1,017,000 lb. As for future plantings that might be made, it would be three years before they reached the stage where the beans would be produced in commercial quantities. I have these figures from Thurston & Braidich, a large user of Mexican vanilla.

Commercial quantities of vanilla cannot be hoped for from the wild vanilla that grows in South America. And for 15 years the government has been trying to foster the growth of vanilla in Puerto Rico, but without much result, some 2,000 lb. of beans being the present annual harvest. Also, while it is possible to grow vanilla in Central and South America, and the West Indies, very little is harvested.

Should the Madagascar area join free France—and the British blockade be lifted—the vanilla situation might soon change. And there is additional hope in that Ray Schlotterer, secretary of the Vanilla Bean Association, estimates that the 1941–42 Mexican crop will be

Sources of essential oils and flavors available to the United States under the restricted conditions of ocean traffic caused by the war are indicated on this map of the world. Regions that formerly supplied part of this country's needs for these materials, shown shaded on the map, including most of Europe and parts of Africa and Asia, are no longer open to trade with the United States, while unshaded sources are still open.

heavier than the current crop. In the meanwhile, vanilla-like synthetic flavors are available as substitutes.

Chocolate and Kola

Chocolate, second only to vanilla as a flavor for many food manufacturers, is still easy to obtain, and if cacao beans from West Africa have become uncertain cargoes, there are plenty still available from Central America, South America and the West Indies.

Though shipments of kola nuts from Madagascar, India and East Africa have been cut off, this flavoring material still comes from Brazil and other South American countries. Also, supplies on hand are considerable, according to Mr. Rarisch of S. B. Penick & Co. It is difficult, though, to get the nuts from the particular areas from which certain firms have heretofore obtained their supply, as Mr. Rosett of Florasynth Laboratories complains. And the chemistry of the soil where the plant is grown is important.

J. H. Beach, president of the Flavoring Extract Manufacturer's Association, says that the trouble of kola users arises from difficulty in getting the identical caffeine (chiefly derived from tea) that is used in combination with the nut. Mr. Beach, incidentally, advocates a differential tax on non-beverage grain alcohol, of which some flavoring extracts contain as much as 85 percent. The present tax is about 24 times the distiller's selling price and makes the manufacture of extracts unduly expensive.

Western Hemisphere Flavors

Fortunately we have enough of certain domestic flavoring plants, not only to supply our own needs, but also to sell to other countries. For instance, fruit flavors, including strawberry, raspberry, cherry, orange and lemon, are abundant. True, Italian lemon oil no longer comes in and is growing scarce, but California supplies increasing amounts of this flavor. A similar situation exists with regard to imported orange oil, but there is much promise in orange oil from Brazil.

California also supplies almonds, to replace those from the Mediterranean. Pistache nuts from Syria, Sicily and Persia no longer come in and are not yet grown in commercial quantities in our Southwest. Nor can we replace the French and Italian chestnuts. But we have pecans, black walnuts, English walnuts, hickories, filberts, chinquapins and peanuts in abundance, among the nut flavors. Also, coconut from the Pacific and from the West Indies supplies a flavor of many uses.

The ginger used in ginger ale and other products is readily available from the West Indies and is one of the most important flavorings. "Manufacturers use the oleoresin," says Mr. Downey, "because the oil of ginger by itself has only aroma, not *bite*."

Horseradish, garlic and dill are all grown in sufficient quantity in the United States. Sweet birch and sassafras, from Kentucky and elsewhere, are also native flavorings.

America produces high-grade commercial spearmint, largely in Oregon, but also in other sections. Peppermint is also a native crop, being grown particularly in Michigan and the Pacific Northwest. It is scarce at present and the price has been rising for several months. However, larger crops can readily be grown, replacing the menthol (produced from oil of peppermint) formerly imported from Shanghai and the fine oil of peppermint brought in from England. Wintergreen is also produced abundantly in the United States.

Mr. Rosett of Florasynth Laboratories, like most men in the industry, declares that, while the essential oils formerly imported have been made in this country, it takes two or three years for many

(*Turn to page 93*)

Directly above—Weighing out "Desert Dainties" into 3-lb. cans, a package seen in food stores over the country. Dates pour down from a bin onto the table.

Above right—Already beyond reach of pickers on tall ladders, in a few years these date palms will reach a height of 90 ft. How dates will be picked then perplexes growers. Likely the trees will be abandoned.

Below—Young lady shows cameraman how paper "umbrellas" are put over dates to protect them from rains, should any happen to fall.

California Desert

Land formerly waste produces 11,000,000 lb. of is tops in quality. Scientists of the Department of

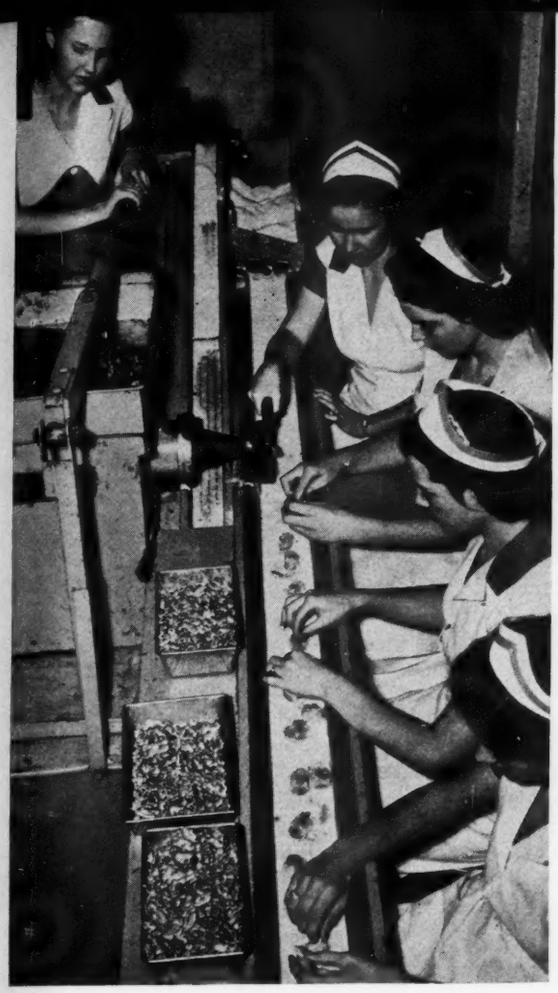
By ANDREW R. BOONE,

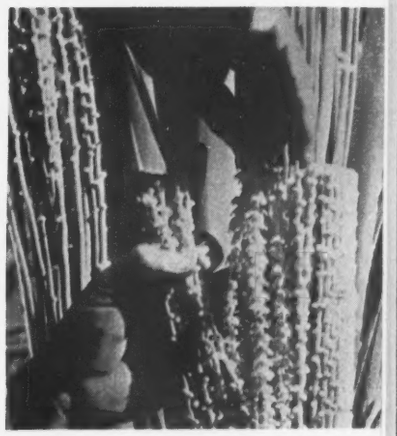
IN 35 years the quality of American-grown dates has been improved to the point where they have no rivals. Eleven million pounds of dates is produced by 100,000 palms on 2,000 acres in California's Coachella Valley, much of this land being situated below the level of the sea in an area which a few years ago was desert waste. This important American food crop is the result of a determined effort by scientists and farmers to establish in the United States a date empire rivalling the historic gardens of Northern Africa.

Although the gardens of the Coachella valley are among the world's largest producers, U.S. Department of Agriculture scientists are now embarked on a program of discovery and culture which they hope will make possible the spreading of date production further into the valleys of the Gila, Salt and Colorado rivers, and in Texas.

The first American dates were planted at Mecca, Calif., in 1904, after Dr. Walter T. Swingle, Department of Agriculture explorer, had shipped to America several score offshoots from African palms.

Unlike most products of the soil, dates require high temperatures and long dry summers, though seven to 10 acre-feet of water is required to nurture their roots. Hence most varieties grow under paper "umbrellas," which shed water and prevent cracking of the delicate skins. "Upside down parachutes," or saucer-like cloth containers, are suspended





Extreme left, above—Small dates are seeded, pressed into rolls and covered with coconut. Then nuts are added.

Top of page--Nimble fingers quickly sort dates as belt conveyor carries them along.

Above left—Heat-sealing transparent-cellulose bag for dates.

Above right—Female date flowers are pollinated by placing male blossoms within cluster.

Below—Jacqueline Lambert, named date queen in celebration of bumper crop of 11,000,000 lb.

Becomes Date Oasis

dates in year. American product improved until it Agriculture hope to spread domestic production further.

Los Angeles, Calif.

underneath softer kinds which drop when ripe.

Unlike any other American crop, dates are literally hand-raised from the beginning. First, in the spring, helmeted men, bare to the waist, climb tall ladders and push their way through the leaves to the heart of each tree. They cut away long, vicious, sharp thorns as they proceed. A few weeks later they return, and when they reach the blooms, called spaths, they tie sprigs of male blossoms within the cluster of the female flowers. Hand pollinating is made necessary because the bees and other insects will have nothing to do with the female flowers, perhaps because the odor fails to attract them.

Pollinating is usually completed during the spring, and by May the pumps are beginning to run day and night, pouring out onto the parched land great quantities of water. The roots, which extend from tree to tree until the 50 palms on each acre are literally linked underground in an intricate root system, drink copiously. But the dates themselves would swell and burst were rain to fall. Hence the paper umbrellas.

After picking in late autumn, the dates are moved to a packing house; they must be handled like eggs, for they are quite fragile. They are first stored in refrigerated rooms. Some are fumigated, and others are bathed in a steam room until they become soft and tender. The less choice fruit goes into byproducts, such as candies.

How to Compare Industrial and Test Sieves

Shape of perforations or meshes and inclination of screens influence work done by sieves

By RUDOLF KOHN, *Kipp-Kelly, Ltd., Winnipeg, Canada.*

IN an article entitled "Factors to Consider When Size-grading Granular Materials," in FOOD INDUSTRIES, January, 1941, page 48, the influence of various factors on size-grading was discussed. The present article is a further discussion of that part of the first article that dealt with the comparison of the work done by industrial and test sieves.

Dependent upon the shape of the perforations or meshes in the sieve, size-grading has different technical meanings. The following may be considered as the most important, as far as the separation of food products is concerned:

1. When grading round or oval materials, for example, peas, over round perforations (see Fig. 1*a*), a separation according to the smallest section of the material is obtained.

2. Oblong grains such as wheat, barley, oats and rye are graded according to their width by oblong perforations (see Fig. 1*b*).

3. Particles of most various shapes and kinds, such as fine seeds, milling stocks, and so forth, are sifted over square meshes of wire or textile fabric (see Fig. 1*c*).

As the particles advance on industrial sieves, they cannot pass the openings (in Figs. 1*a* and 1*c*) in a vertical direction except when the advance is periodically stopped. Close-to-size particles have therefore a limited, if any, number of opportunities to pass through and industrial sieve.

Oblong grains will not always travel parallel to the oblong perforations, as shown in Fig. 1*b*, when advancing on an industrial sieve. Consequently, close-to-size particles within a certain range of sizes will be irregularly graded.

In contrast, when using test sieves, the opportunities for the passage of close-to-size particles are considerably increased. As a consequence, equal performance to test-sieve results will not generally be obtained on industrial sieves, even when working with very small inputs. Therefore, output and the required grading precision should always be jointly indicated in grading problems.

The diagram of granulation, simultaneously showing the ungraded product and the result of the separation, as indicated in the article already mentioned (FOOD INDUSTRIES, January, 1941), is particularly useful for comparing grading operations of industrial and test sieves. Construction of these diagrams requires knowledge of the relative weights of "oversize," "undersize" and ungraded product. When the weight of these grades cannot be directly determined, the proportions can be calculated from granulation tests. This calculation is based on the fact that all particles larger than M are to be found in the oversize. If the meshes of the industrial sieve are irregular, the largest mesh will be indicated by M.

Then A/B percent is the ratio: $\frac{\text{oversize}}{\text{ungraded}}$

where A percent is the percentage of particles larger than M in the ungraded product and B percent is the percentage of particles larger than M in the "tails".

Having analyzed the oversize by a set of test sieves, as usual, the percentages of "throughs" (referring to the total quantity of oversize as 100 percent) must be multiplied by this factor A/B, in order to obtain the percentages referring to the ungraded product. Then the line of separation can be easily drawn.

By using an analogous procedure to establish the composition of the "undersize," a test control will be obtained. The additional percentages of "undersize" and "oversize" for any test sieve must equal the corresponding percentage of "throughs" for the ungraded product.

In Fig. 2*a* is shown a diagram of granulation in which a number of points, as m_1, m_2, m_3, have been determined. When the product represented by Fig. 2*a* is sifted over a test sieve, all particles smaller than the openings of the mesh, M_t, pass through. The resulting separation is shown in Fig. 2*b*.

With an industrial separation carried out over meshes M, the particles in the range of sizes between M_o and M are irregularly graded according to Fig. 2*c* (which corresponds to Fig. 1 of the article, FOOD INDUSTRIES, January, 1941, p. 48). By means of the two figures, Fig. 2*b* and Fig. 2*c*, it is possible to make an enlightening comparison of the industrial sieve (M) and a test sieve (M_t), having the same ratio of "undersize" and "oversize."

The difference between these two separations becomes still clearer in Fig. 3*c*, which shows that, in the industrial separation, P percent particles smaller than M_t remain in the "tails," while the "throughs" contain the same amount of particles larger than M_t. The distance P, between the points where the ordinate M_t cuts the curve of granulation and the line of separation, shows directly the amount of particles that have not been graded according to size. The amount P depends upon the composition of the product (and therefore upon the slope of the curve of granulation) and the characteristics of the sieve (determining the range M_o to M). The diagram also shows under what technical and economic conditions a specified grading precision over sieve M_o (see Fig. 2*c*) can be obtained.

In Fig. 3*a* is shown a diagram of a sieve with steep inclination and meshes M_t, through which the particles must pass at an acute angle. Assuming that this angle is constant, the separation obtained would be as shown in Fig. 3*b*,

(*Turn to page 93*)

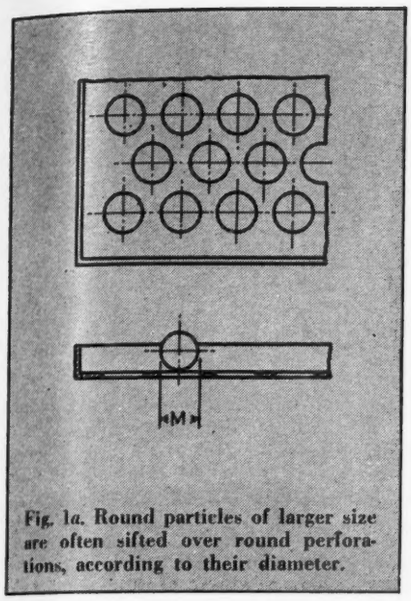


Fig. 1*a*. Round particles of larger size are often sifted over round perforations, according to their diameter.

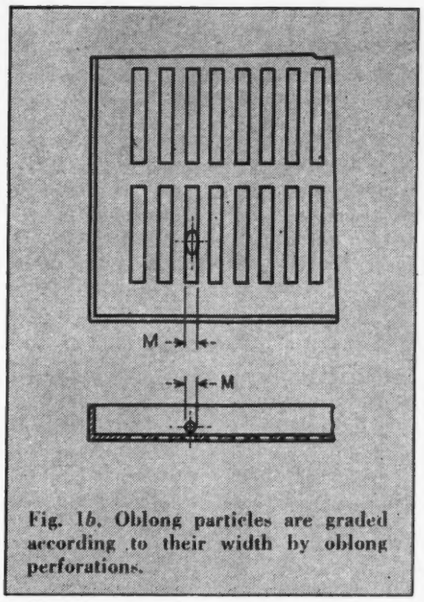


Fig. 1*b*. Oblong particles are graded according to their width by oblong perforations.

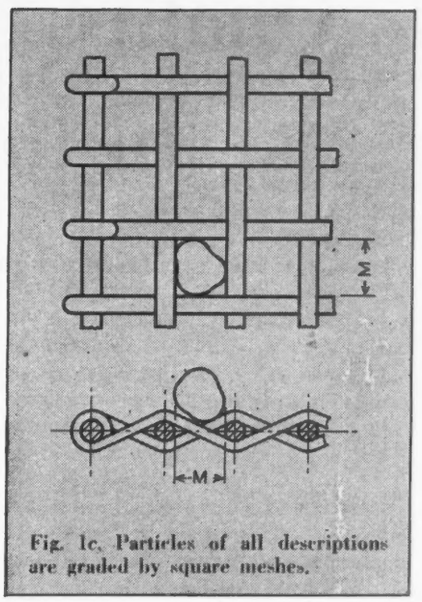


Fig. 1*c*. Particles of all descriptions are graded by square meshes.

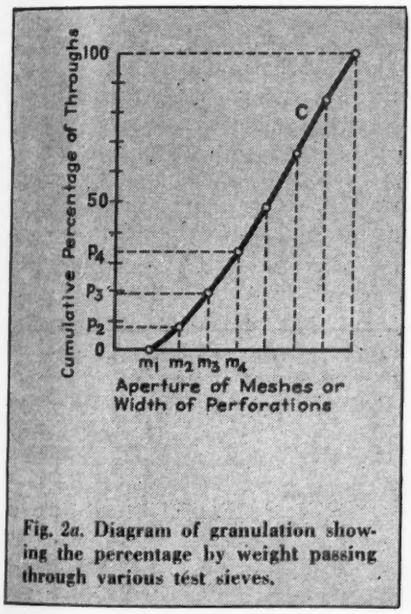


Fig. 2*a*. Diagram of granulation showing the percentage by weight passing through various test sieves.

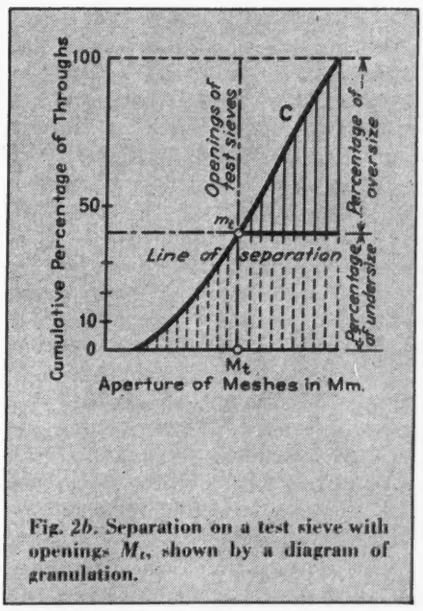


Fig. 2*b*. Separation on a test sieve with openings M_t, shown by a diagram of granulation.

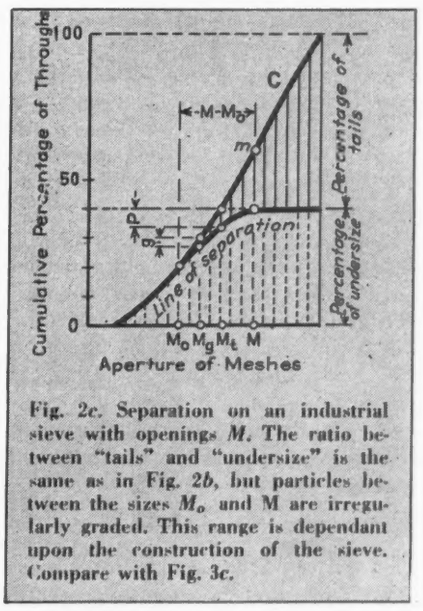


Fig. 2*c*. Separation on an industrial sieve with openings *M*. The ratio between "tails" and "undersize" is the same as in Fig. 2*b*, but particles between the sizes M_o and M are irregularly graded. This range is dependant upon the construction of the sieve. Compare with Fig. 3*c*.

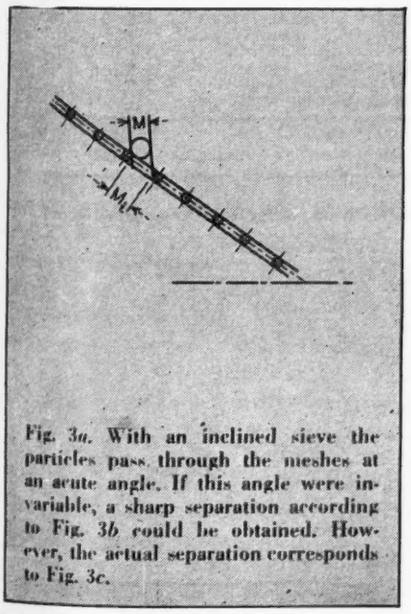


Fig. 3*a*. With an inclined sieve the particles pass through the meshes at an acute angle. If this angle were invariable, a sharp separation according to Fig. 3*b* could be obtained. However, the actual separation corresponds to Fig. 3*c*.

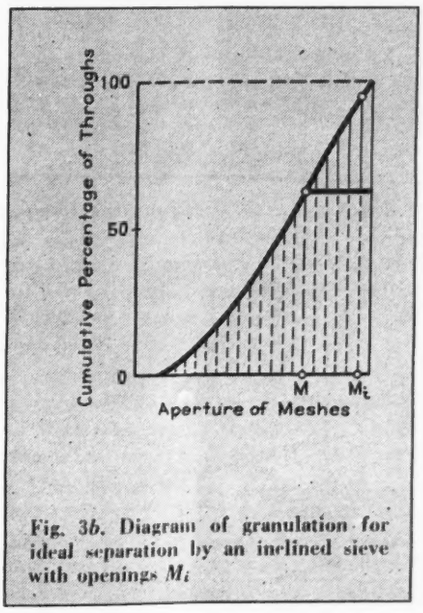


Fig. 3*b*. Diagram of granulation for ideal separation by an inclined sieve with openings M_i

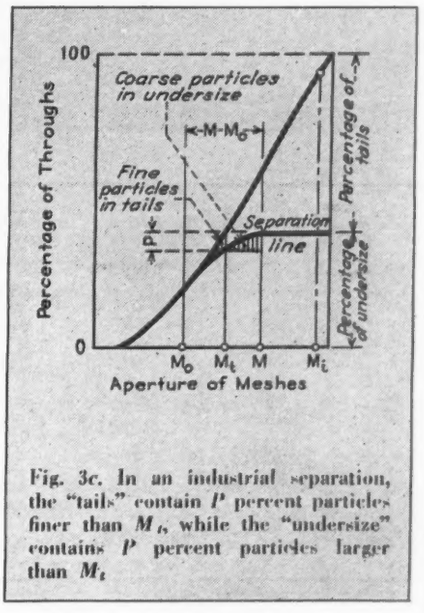


Fig. 3*c*. In an industrial separation, the "tails" contain P' percent particles finer than M_t, while the "undersize" contains P percent particles larger than M_t

Quality Control of Operations In the Beverage Plant

Part II—Carbonation, bottle cleaning and control coordination*

By S. S. EPSTEIN, *chemist, and* M. KIRSCH, *president, Kirsch's Beverages, Inc.,*
Brooklyn, N. Y.

AFTER observing for many years the reaction of consumers to the gas content of various beverages, our plant adopted a so-called standard carbonation, as shown in Table II. The gas content of the beverages is expressed in terms of volumes of carbon dioxide gas per unit volume of liquid in the bottle. Determination of the gas content of a given beverage is made by means of a gas volume tester and a thermometer. Obtained pressure and temperature values are referred to standard charts for conversion to volumes of gas.

Proper carbonation is largely dependent upon precise control of the carbonating pressure and the water temperature at the time of carbonation. Constant sirup temperature, water temperature and carbonating pressure should control the volume of gas in the beverage. Coordinating of the operations, that is, simultaneous cooling and carbonating, goes a long way in helping maintain uniform carbonation.

These desirable features of carbonation, we feel, are realized at our plant through the use of a Mojonnier "Carbo-Cooler," a combined cooler and carbonator. The gas pressure in the carbonator is adjusted to a fixed rate by means of a regulator mounted at a convenient position on the Carbo-Cooler body, and this rate is indicated on two gages, also mounted on the unit. The pressure of carbonation employed varies with the flavor bottled as evidenced by reference to the gas standards in Table II.

The pressure of carbonation in the Carbo-Cooler, as shown on the gages, is regarded more as an index of the amount of carbon dioxide in the finished drink. Actual volumes of gas present are based upon tests of one or several bottles during the beginning of the run and later at short time intervals, whenever necessary. A gas volume tester, a thermometer, a gas chart, bottle openers and record sheets are maintained in a convenient location, directly opposite the Carbo-Cooler. Actual conditions found at the hour of tests are recorded. Thus permanent written records are available for future reference. Two typical daily record sheets from July and November of 1940 are shown in Tables III-*A* and III-*B*.

After noting the information shown in the record sheets, it becomes evident that carbonation is at low pressure. This method of carbonation takes advantage of the higher solubility of carbon dioxide gas in low temperature water. During filling there is only a slight counter-pressure and very little agitation. The counter-pressure is removed and the uncapped bottles are conveyed a short distance from filler to crowner, during which time a slight evolution of gas removes air from the neck-space.

Bottle Cleaning

The production of a clean and sterile bottle is an absolute necessity for the successful manufacture of any carbonated beverage. We have two Meyer Dumore bottle cleaning machines in our plant. Each has five compartments. Machine No. 1 is used for cleaning 29-oz. bottles and machine No. 2 is used for cleaning 8- and 12-oz. bottles.

* Part I of this article was published in FOOD INDUSTRIES, January, 1941.

Table II—Gas (Carbon Dioxide) Content of Beverages

Flavor	Volumes of Gas: 8- and 12-oz. bottles	Volumes of Gas: 29-oz. bottles
Celery	3.5+	3.8
Cherry	3.0	3.5
Chocolate Cream	3.0	3.5
Cream	3.0+	3.5
Golden Ginger Ale	3.5	3.8+
Grape	3.0	3.5
Heart of Orange	1.0	...
Lemon	...	3.8
Lemon & Lime	3.0	3.5
Lime Dry	...	3.8
Lime Rickey	...	3.8
Orange	2.0	2.0
Pale Dry Ginger Ale	4.0+	4.0+
Raspberry	3.0	3.5
Root Beer	3.0	3.5
Sarsaparilla	3.0	3.5
Sparkling Water	4.0+	4.0+
Tom Collins	...	3.8+

Table III-*A*—Daily Record of Carbonation of Beverages.

Friday, July 5, 1940

Hour	Beverage	Bottle oz.	G.P.†	Deg. F.	Vol. gas	Carbonator G.P.†	Carbonator Deg. F.	Taken by
8:05	Lemon & Lime	12	28	56	3.1	53	44	*E*
8:10	Celery	29	33	52	3.7	53	44	*E*
8:30	Lemon & Lime	12	30	56	3.2	55	44	*M*
8:35	Celery	29	34	52	3.8	55	44	*M*
10:00	Cream	29	31	50	3.65	55	42	*E*
11:00	Heart of Orange*	12	2	70	1.0	..	..	*M*
2:00	Orange	29	17	58	2.2	32	45	*M*
3:00	Grape	12	24	52	3.0	32	45	*E*
4:00	Sarsaparilla	29	29	50	3.5	40	42	*M*
4:10	Grape	12	25	50	3.2	40	42	*M*

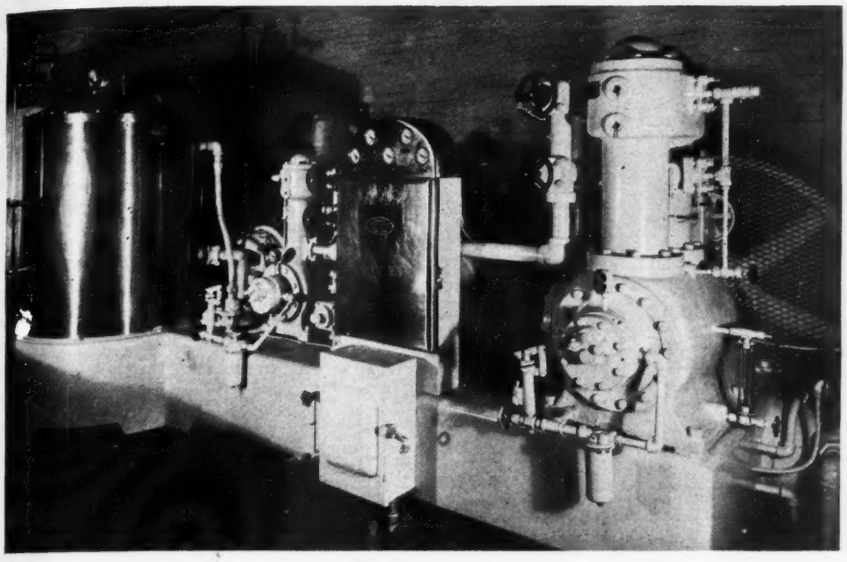
* Carbo-Cooler not used. Carbonated water introduced into filler by special method.
† G.P. = Gas pressure.

Table III-*B*—Daily Record of Carbonation of Beverages.

Wednesday, November 13, 1940

Hour	Beverage	Bottle Oz.	G.P.†	Deg. F.	Vol. gas	Carbonator G.P.†	Carbonator Deg. F.	Taken by
8:10	Pale Dry	29	34	46	4.2	60	35	*K*
8:40	Pale Dry	12	33	49	3.9	60	34	*K*
10:25	Celery	12	32	49	3.8	60	34	*K*
10:30	Pale Dry	29	32	43	4.3	60	34	*K*
11:05	Celery	12	29	47	3.7	50	34	*E*
11:20	Cream	29	28	45	3.8	50	34	*K*
11:25	Celery	12	27	47½	3.55	50	34	*E*
1:15	Cream	29	30	51	3.5	53	40	*K*
1:20	Celery	12	32	53	3.6	53	40	*K*
1:50	Raspberry	29	30	51	3.5	53	40	*K*
2:00	Heart of Orange*	12	3	70	1.0	..	..	*K*
3:30	Cherry	29	30	51	3.5	53	40	*K*
4:40	Sarsaparilla	12	28	53	3.2	53	40	*K*

* Carbo-Cooler not used. Carbonated water introduced into filler by special method.
† G.P. = Gas Pressure.



Water supply for the bottling machines is cooled and carbonated by this "Carbo-Cooler" unit, which controls the proportion of carbon dioxide added to the water in accordance with the varying requirements of each different flavoring sirup.

These machines are not treated in the same way, because our 29-oz. bottles are provided with larger labels and aluminum foils. For this reason an agitator is placed in the third compartment of machine No. 1 so as to prevent clogging caused by removed labels and foils. The time of passage of a bottle through a compartment in machine No. 1 is 5 minutes and 15 seconds, as compared to 4 minutes and 8 seconds for a bottle to pass through a compartment of machine No. 2.

Caustic soda (sodium hydroxide) alone is employed by us to clean and sterilize bottles. The conditions of use are well within the scope of recommendations of the American Bottlers of Carbonated Beverages for mechanical bottle washing and within the scope of stipulations of the New York City Health Department for the sterilization of milk bottles.

In the ABCB educational bulletin (revised edition) on bottle washing and its control in the carbonated beverage industry, Buchanan and Levine state: "A concentration of not less than 3 percent alkali, of which at least 60 percent is caustic, with a minimum contact period of 5 minutes and a temperature of 130 deg. F. is recommended." A mixture of 1.8 percent sodium hydroxide and 1.2 percent sodium carbonate has about the same germicidal value as 2.0 percent NaOH solution. At 150 deg. F. Buchanan and Levine found that 99.9 percent of a million spores of bacteria were killed within 5.7 minutes by 2 percent caustic.

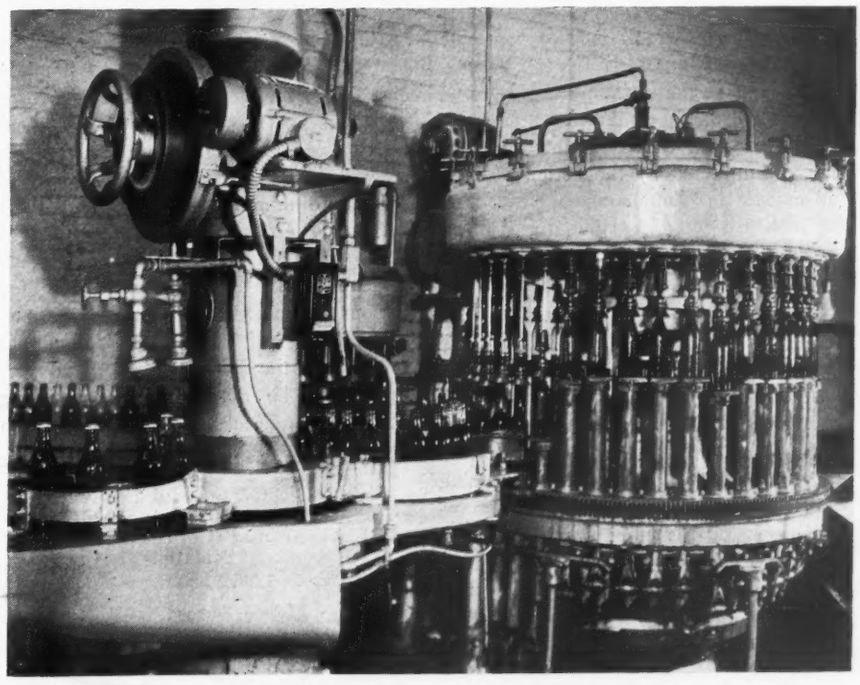
The New York City Health Department stipulation for the sterilization of milk bottles calls for an exposure of 7 minutes to 2 percent sodium hydroxide solution at 150 deg. F. Levine[1] recently presented some very interesting germicidal equivalents with respect to percent of sodium hydroxide, temperature and holding time for the New York City Health Department's specifications for milk bottles. These values are shown in Table IV.

The original charge of caustic in the various compartments of each of our bottle washing units and the temperatures maintained are shown in Table V. We have found that the addition of 200 p.p.m. of "Calgon" (sodium hexametaphosphate) in the fourth compartment in each unit when first charging gives the bottles an extra fine polish.

Compartments *A* and *B* of machine No. 1 are emptied after 70 to 80 hours of operation, while the solutions in compartments *C* and *D* are changed after 30 to 40 hours of operation. The caustic strengths of compartment *A* and *B* are maintained at levels above 1 and 3 percent, respectively, as determined by daily chemical titrations, employing the new caustic technic of Shillinglaw and Levine[2] discussed at the 1939 ABCB convention.

Compartments *B* and *C* of machine No. 2 are changed after about 120 hours of operation, while *A* and *D* are emptied and renewed every 40 to 50 hours. Causticities of compartments *A*, *B*, and *C* are maintained at levels above 1, 1, and 3 percent, respectively, as based on chemical titrations. Compartments *D* of both machines have no original caustic charge but caustic is continuously carried over from preceding compartments, so that after four days' run about 1 percent of sodium hydroxide is usually found.

Reference to Table IV shows that bottles exposed to 3 percent caustic at 150 deg. F. for 3.4 minutes receive the same germicidal treatment as bottles exposed to 2 percent caustic for 7 minutes at 150 deg. F., the New York City specifications for milk bottles. In our case, exposures are for more than



Filling and capping equipment in one of the bottling lines at Kirsch's plant.

Because of painstaking quality control, Kirsch's beverages retain full quality for long periods and the company can manufacture for stock during periods when demand is low. This evens the work out over the entire year and enables peak demands to be met without undue overtime work. The picture shows one of three warehouses maintained by the company for storage of off-peak-bottled goods.

4 minutes with small bottles and for more than 5 minutes with large bottles.

Lowering of the germicidal powers of sodium hydroxide due to accumulation of organic matter is undoubtedly more than counteracted by the action of heat and caustic in compartments other than the one presently considered. Numerous tests of bottles from both washing units have shown practical sterility in every instance.

Control Coordination

Good quality beverages must be biologically stable. Every process designed to eliminate existing microbial life and every operation aimed at minimizing opportunities for contact of microorganisms with ingredients must be frequently checked for efficiency. A complete biological picture of the bottling procedure at any given time is obtained by proper bacteriological examinations of all ingredients involved.

Bacteriological tests of flavor, of sugar color, of simple sirup from the Seitz filter and of flavored sirup from the sirup tank show the set-up in the sirup room. Additional tests of flavored sirup at the siruper preceding the filler, of bottles from the soaker, of water going to and from the Carbo-Cooler and of the finished drink in capped bottles complete the biological picture.

Bacteriological tests are recorded in terms of numbers of yeasts and numbers of bacteria per gram of sugar. In this way results of tests of sugar solutions, of flavored sirups from sirupers and of the finished beverage may be coordinated. On very rare occasions we have found disagreement of results of tests of flavored sirups from sirupers and of finished drinks, indicating filler valves as a possible source of biological contamination. Treatment of all valves on the filling unit with 250 p.p.m. of chlorine eliminated such trouble.

It has been stated that uniformity of sugar content in any particular beverage is governed by the consistency of preparations in the sirup room. Given any density value of flavored sirup, the sugar content of the finished carbonated beverage can be determined by applying the following formula: Lb. sugar per gal. in beverage = lb. sugar per gal. in flavored sirup × oz. of sirup throw ÷ oz. content of bottle.

Baumé hydrometer readings of the flavored sirup are referred to the table in U.S. Bureau of Standards Circular No. 375, and converted to pounds of sugar per gallon. The ounce throw is based on the designation of the siruper regulator.

Actual plant records may best illustrate the workings of the given formula. The Baumé reading of *A* sirup was found at 25.5 deg. The designated sirup throw was 5 oz. and the bottle content was 29 oz. Reference to the table showed 25.5 deg. Baumé for 4.688 lb. of sugar per gal. Employing these figures in the above formula we have:

Lb. sugar per gal. in beverage =

$$4.688 \times \frac{5}{29} = 0.802112$$

A sugar solution of 0.802112 lb. per gallon is one of 9.40 percent sugar by weight.

A 29-oz. bottle of *B* carbonated beverage was made from a 32.8 deg. Baumé sirup. Therefore;

Lb. sugar per gal. in beverage =

$$6.47 \times \frac{5}{29} = 1.115428 = 12.75$$

percent sugar by weight

Actual percentages of sugar in the *A* and *B* beverages were 9.2 and 12.6, respectively. The differences between mathematically calculated values and actual values of sugar concentrations in the finished drink are caused by mechanical operations of the siruper unit. Complete emptying of a sirup cup, regulated at a designated throw, is never realized because a film of sirup is retained in the cup.

From the above it is evident that accumulation of data on each bottled flavor provides means of adjusting and determining the sugar content of a finished beverage through sirup operation and also a means of knowing the consistency of a sirup by sugar evaluation of the finished drink.

During the past year we have been bottling a franchised orange beverage known as "Heart Of Orange." This beverage is made with one volume of carbon dioxide. The flavored sirup is pulpy. Because of the pulpy character of the sirup and its relatively high density, slightly higher differences are found between calculated and actual values of sugar content in the finished carbonated drink.

Table IV—Germicidal Equivalents (Killing Times for Designated Temperatures and Concentrations of NaOH).

(*Base: New York City Specifications for Milk Bottles*)

	Percent NaOH				
	1.0	1.5	2.0	2.5	3.0
Deg. F.	Time to kill (in minutes)				
110	432.0	209.0	125.0	83.3	60.4
120	210.0	102.0	60.8	40.7	29.4
130	103.0	49.5	29.6	19.8	14.3
140	49.8	24.1	14.4	9.7	7.0
150	24.2	11.7	7.0	4.7	3.4
160	11.8	5.7	3.4	2.3	1.6
170	5.7	2.8	1.7	1.1	0.8
180	2.8	1.3	0.8	0.5	0.4

Table V—Causticities and Temperatures of Bottle-cleaning Machines.

	No. 1 (29-oz. bottles)		No. 2 (8- and 12-oz. bottles)	
Compartment	Percent caustic	Deg. F.	Percent caustic	Deg. F.
A	1.5	125–130	1.25	110–120
B	3.0	150–160	1.00	130–140
C	1.0	135–140	3.00	150–160
*D**	0.0	120–125	0.00	125–130
E	Fresh water daily	95–100	Fresh water daily	95–100

* 200 p.p.m. "Calgon."

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Use of Dry Sugar in Sweetening Foods Canned in Sirup

Part I—Investigation of the physical aspects. Dry sugar at bottom of can does not completely dissolve during heat sterilization process, and strata of sugar sirups are formed in the can

By O. G. BRAUN, G. L. HAYS and H. A. BENJAMIN, *Research Department, American Can Co., Maywood, Ill.*

IN commercial canning practices, many foods are sweetened by the addition of a sirup containing the required amount of sugar. During recent years, however, some canners have become interested in sweetening such foods by the direct addition of dry sugar. In this procedure, the desired amount of sugar is measured into the bottom of the clean, empty can; the proper amount of the food is then filled into the can and the fill of the container completed by the addition of hot water.

Such a procedure possesses several very obvious advantages. It dispenses with the necessity of equipment required for the preparation of large volumes of sirup; it also avoids loss of sugar through loss of sirup at the siruping station and during transfer to the can sealing machine. This procedure appeared especially attractive to canners of sweet potatoes located in different sections of the country, with the result that several packers of this commodity adopted the dry sweetening procedure. Such canners have frequently experienced an excessive amount of both flat sour and swell spoilage following adoption of the new procedure, despite the fact that proven heat processes had been employed. Suspicion was immediately directed towards the new sweetening procedure, especially towards its possible influence on the sterilizing values of the heat processes applied.

Preliminary experiments showed definitely that when water was added to dry sugar placed in the bottom of a large test tube and the mixture heated for 70 minutes at 240 deg. F. without agitation, a portion of the sugar did not dissolve. Moreover, the concentration of the sirup adjacent to the undissolved sugar was very high as compared to the concentration at the top of the tube. Heat penetration tests on a can of sweet potatoes to which dry sugar had been added before the can was filled with hot water and sealed showed a marked decrease in the rate of heat penetration as compared with that of a can of potatoes to which the sugar had been added in sirup form. In addition, the thermal death time of spores of an organism responsible for one outbreak of flat sour spoilage in canned sweet potatoes was found to be materially increased in sugar solutions of concentrations comparable to those observed in the lower parts of the heated tubes. These observations led to a more intensive investigation of the bacteriological and technological aspects of this problem. the results of which are reported herein.

Canning Trials

In the direct addition of dry sugar in canning sweet potatoes it has been assumed that this material would dissolve almost immediately upon the addition of hot water to the can. However, as described, preliminary experiments made by introducing dry sugar into the bottom of a test tube, and, after filling with water, sealing and processing the tube, showed that a portion of the sugar remained undissolved after a 70-minute process at 240 deg. F. In addition, as stated before, it was noted in this test that horizontal layers through the tubes had progressively decreasing densities as the distance above the undissolved sugar increased. Magoon and Culpepper[10] have shown a slight difference in rate of heating of cans filled with varying densities of sugar solutions and attribute the slower heating of the more dense solutions to the somewhat greater viscosities of these media. It was believed that the presence of the concentrated viscous layer of sirup suspected near the bottom of cans of sweet potatoes to which dry sugar had been added would therefore result in a process of lower bac-

ABSTRACT

COMMERCIAL ATTEMPTS to sweeten sirup-packed foods by adding dry sugar to the empty can, followed by the addition of the food and of water to complete the fill of the container, have resulted in swell and flat-sour spoilage. The authors demonstrate by laboratory and canning tests that dry sugar at the bottom of the can does not completely dissolve during the heat sterilizing process. Instead, strata of sugar sirups are formed within the can, which show decreased concentration of sugar from the bottom to the top of the container. Data are presented to show that the severity of a given heat treatment is materially less in cans packed with dry sugar than in similar cans in which the sugar was added in sirup form. Data are also presented to show that spores of typical spoilage organisms show increased thermal death times with increase of sugar concentration of sirups in which they are suspended. This increase in thermal death time is particularly notable between 50 and 70 percent of sucrose in the sirups. Since concentrations of sugar in this range are shown to occur in packing foods with dry sugar, this increase in thermal death time and decrease in sterilizing value of the process inherent with this method of packing makes its use extremely hazardous unless some means of agitation is provided to insure solution of the sugar and thorough mixing of the sirup within the can before processing.

* Paper presented at convention of National Canners Association in Chicago, week of January 19, 1941. The original title is "Observations on the Use of Dry Sugar in Sweetening Foods Canned in Sirup."

tericidal value in this area. Another factor suspected of causing slower heat penetration was the thermal insulative effect of the layer of undissolved sugar at the bottom of the can which would reduce the effective area of heat transfer. In an attempt to check these observations the following experiments were conducted.

TABLE I—Distribution of Sugar Concentration in 401×411 Cans of Sweet Potatoes Packed with Dry Sugar.

Lot No.	Lot No.	Method of addition of sugar	Treatment after closure	Sugar Concentration: Top* of can (%)	Top to 3½″ from bottom (%)	3½ to 2½″ from bottom (%)	2½ to 1½″ from bottom (%)	1½ to ½″ from bottom (%)	Bottom ½″ of can (%)	Undissolved sugar in bottom of can (oz.)
40*V*	1	On top	No agitation	18.2	18.2	18.4	18.4	25.4	44.0	0.30
41*V*			No agitation	22.4	21.6	21.8	22.8	26.2	43.6	0.48
42*V*	1a	On bottom	No agitation	14.6	14.4	14.6	17.8	27.7	50.6	1.11
43*V*			No agitation	22.0	21.8	22.2	23.0	26.0	37.8	0.22
44*V*	2	On top	Inverted	24.2	24.3	24.4	24.4	24.6	24.6	None
45*V*			Inverted	24.6	24.8	24.8	24.8	25.2	25.2	None
46*V*	2a	On bottom	Inverted	25.6	25.6	25.6	25.8	26.4	27.0	None
47*V*			Inverted	24.4	24.4	24.8	24.8	25.2	26.2	None
48*V*	3	On top	Rolled	24.4	23.8	24.7	25.4	26.5	26.7	None
49*V*			Rolled	23.8	23.4	23.4	23.4	26.2	28.0	None
50*V*	3a	On bottom	Rolled	24.6	24.6	24.8	24.8	26.2	28.0	None
51*V*			Rolled	22.2	23.0	23.3	23.6	23.7	23.8	None
52*V*	4	On top	Cans shaken	24.8	24.6	24.6	24.7	25.0	25.2	None
53*V*			Cans shaken	23.4	23.0	23.2	23.3	23.6	23.6	None
54*V*	4a	On bottom	Cans shaken	24.8	24.8	24.8	24.8	24.8	24.8	None
55*V*			Cans shaken	25.4	25.0	25.0	25.2	25.4	25.6	None
56*V*	5	As sirup	No agitation	25.8	25.8	....	....	....	27.2	None
57*V*			No agitation	26.4	26.4	....	....	....	26.2	None

* Top of can taken as the end up at time of processing. Cans 44*V* and 45*V* examined in inverted position with can bottom considered as top.

TABLE II—Sterilizing Value of Process of 70 Minutes at 240 Deg. F. in 401×411 Cans of Sweet Potatoes Packed with Dry Sugar and 20 Percent Sirup.

Can No.	Thermocouple position	Method of sugar addition	*U**	*F**	Percent sugar in sirup adjacent to couple at end of process
1	Center	Dry	37.0	10.3	17.9
2	Center	Dry	39.7	11.0	15.0
3	Center	Dry	41.0	11.4	11.4
4	Center	Dry	25.3	9.8	14.0
5	Center	Dry	42.6	11.9	13.8
Av.	Center	Dry	39.1	10.9	14.4
6	Center	21% sirup	44.5	12.4	
7	Center	21% sirup	52.9	14.7	
8	Center	21% sirup	46.8	13.0	
9	Center	21% sirup	53.0	14.8	
10	Center	21% sirup	58.6	16.3	
Av.	Center	21% sirup	51.1	14.2	
1	Bottom	Dry	26.1	10.1	28.3
2	Bottom	Dry	31.0	8.6	29.6
3	Bottom	Dry	22.5	6.25	22.7
4	Bottom	Dry	28.4	7.9	27.0
5	Bottom	Dry	30.1	8.4	23.4
Av.	Bottom	Dry	29.6	8.23	26.2
6	Bottom	21% sirup			
7	Bottom	21% sirup	36.1	10.1	
8	Bottom	21% sirup	48.0	13.4	
9	Bottom	21% sirup	45.0	12.5	
10	Bottom	21% sirup	45.0	12.5	
Av.	Bottom	21% sirup	....	.....	
			43.6	12.1	

* *U* = Sterilizing value of process in equivalent time (minutes) at 240 deg. F.
* *F* = Sterilizing value of process in equivalent time (minutes) at 250 deg. F.

TABLE III—Evaluation of the Thermal Insulating Effect of Undissolved Sugar at the Bottom of a Can of Sweet Potatoes During the Process.

Can No.	Description	Thermocouple position	U_s	F_s
1	3 oz. wet sugar below false bottom in 401×411 can of sweet potatoes and water	Center of Can	44.8	12.5
2	3 oz. wet sugar below false bottom in 401×411 can of sweet potatoes and water	Center of Can	39.9	11.1
3	401×401 can filled with sweet potatoes and water	Center of Can	47.8	13.3
4	401×401 can filled with sweet potatoes and water	Center of Can	42.2	11.7
5	Regular 401×411 can filled with 3 oz. dry sugar, sweet potatoes and water	Center of Can	43.0	12.0
1	3 oz. wet sugar below false bottom in 401×411 can of sweet potatoes and water	Bottom of Can	39.5	11.0
2	3 oz. wet sugar below false bottom in 401×411 can of sweet potatoes and water	Bottom of Can	36.1	10.0
3	401×401 can filled with sweet potatoes and water	Bottom of Can	45.6	13.0
4	401×401 can filled with sweet potatoes and water	Bottom of Can	44.1	12.3
5	Regular 401×411 can filled with 3 oz. dry sugar, sweet potatoes and water	Bottom of Can	28.4	7.9

Experimental Procedure

Twenty ounces of thoroughly washed, lye-peeled sweet potatoes was weighed into 401x411 plain cans (29 oz. avoir. net capacity) and 2.8 oz. dry sugar was added to each container in various manners, as indicated below. The cans were filled with near-boiling water and, after exhausting for 2½ minutes in steam at 212 deg. F., were sealed and treated as follows:

Lot No.	*Method of addition of sugar*	*Treatment following closure*
1	On top of potatoes	No agitation
1*a*	On bottom of can	No agitation
2	On top of potatoes	Cans inverted
2*a*	On bottom of can	Cans inverted
3	On top of potatoes	Cans rolled 15 seconds
3*a*	On bottom of can	Cans rolled 15 seconds
4	On top of potatoes	Cans shaken 15 seconds
4*a*	On bottom of can	Cans shaken 15 seconds
5	As 21 percent sirup	No agitation

All of the cans were processed for 70 minutes at 240 deg. F., followed by thorough water cooling. Immediately following the cooling period, duplicate cans of each variable were cut and samples of the sirup taken from the top of the liquid and by tapping the body of the container at points 3½, 2½, 1½ and ½ in. from the bottom. The sugar concentrations and densities of the sirup at these various levels were estimated from the refractive indices of the liquid obtained at these levels in the can.

In addition, 401x411 cans were equipped with suitable fittings (Fig. 1) so that one thermocouple could be placed at the can center and one couple ¼ in. above the can bottom when the end was in its normal concave position. To one-half of these cans was added 2.8 oz. of dry sugar and 20 oz. of lye-peeled sweet potatoes and the containers filled with near-boiling water. The remaining five cans were filled with 20 oz. of potatoes and near-boiling 20 percent sugar solution. The cans were filled in such a manner that none of the thermocouples was embedded in the potatoes. All of the cans were exhausted for 3 minutes at 212 deg. F., closed, and processed for 70 minutes at 240 deg. F. without agitation. The thermocouples were connected through suitable leads to a potentiometer outside the retort and time-temperature data observed during the process.

In order to obtain an approximation of the thermal insulating effect of the layer of undissolved sugar on the bottom of the can of sweet potatoes, several 401x411 cans were fitted with false bottoms by soldering a tin-plate disk ⅝ in. above the flange before the bottom end

TABLE IV—Statistical Analysis of Process Lethality.

Thermocouple position	Method of sugar addition	Average lethal value of process (minutes at) 240 deg. F.	250 deg. F.
Can center	As sirup	51.1 ± 1.6	14.2 ± 0.4
Can center	Dry + water	39.1 ± 0.7	10.9 ± 0.2
Difference in lethal value		12.0 ± 1.8	3.3 ± 0.5
Probability of difference being zero or less: 0.0005%			
¼″ above can bottom	As sirup	43.6 ± 1.2	12.1 ± 0.33
¼″ above can bottom	Dry + water	29.6 ± 4.0	8.23 ± 1.12
Difference in lethal value		14.0 ± 4.2	3.87 ± 1.2
Probability of difference being zero or less: 1.2%			

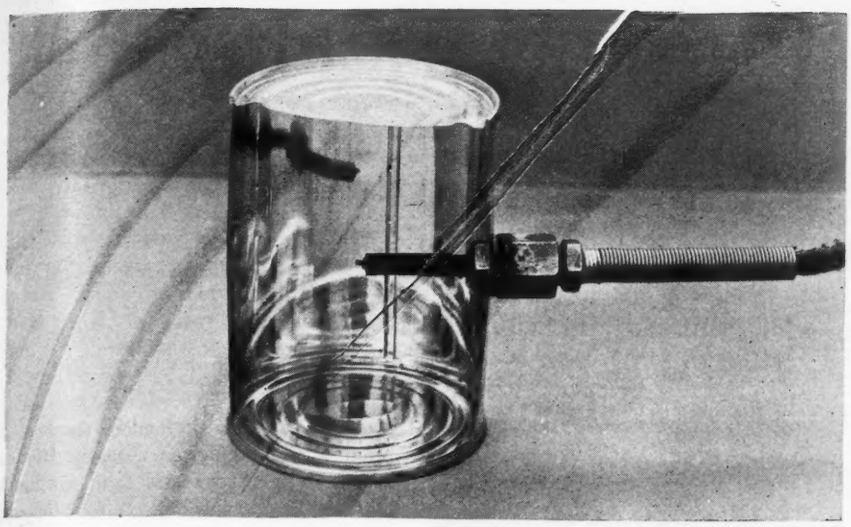

Fig. 1. Thermocouple fitted in can for rate of heat penetration measurements.

was seamed on the body. The space between this disk and the bottom of the can was then filled with approximately 3 oz. of sugar moistened with water and the bottom end seamed in place. Each of these containers was then fitted with a thermocouple ¼ in. above the false bottom and with one at the center of the can. The cans proper were packed with peeled sweet potatoes and filled with near-boiling water. After suitable exhausting, these cans were processed along with control cans to which only potatoes and water had been added, and with a can to which dry sugar as well as potatoes and water had been added. The time-temperature data in these cans were observed during the process.

The data obtained during the examination of the experimental pack, made to determine the distribution of sugar concentration in canned sweet potatoes packed with dry sugar, are presented in Table I. The data obtained during the heat-penetration study were analyzed according to method of Ball[2] and the 70-minute-at-240-deg. F. process was evaluated for each can tested. The lethal values of the process quoted in terms of minutes at 240 deg. F. (U_o) and 250 deg. F. (F_o) are shown in Tables II and III. An analysis of the values of Table II, calculated by standard statistical methods, is presented in Table IV.

Discussion of Results

As indicated above, the values of the sugar concentrations presented in Table I were derived from the refractive indices of the samples of sirup drawn from the various levels of the can. These results were checked in a limited number of instances by chemical analysis. While the actual percent total sugar was shown to be from 2 to 9 percent lower than the figures presented due to the presence of other soluble solids derived from the potatoes during the process, the values given do show the relative differences in concentration of the various levels in the can.

It will be noted that in each sample which was not agitated and to which dry sugar had been added—either at the top or the bottom of the can—from 8 to 40 percent of the added sugar was found caked in the bottom of the container after the process of 70 minutes at 240 deg. F. The apparent sugar concentrations in the sirup in these cans ranged from 15 to 22 percent at the top to an apparently saturated solution at the bottom. The refractive indices of portions of the viscous layer of the supersaturated sirup found adjacent to the undissolved sugar in a tube of dry sugar and water processed for 70 minutes at 240 deg. F. corresponded to concentrations ranging from 83 to 85 percent. It is of interest to note that no undissolved sugar was found in any of the cans which were inverted, shaken or rolled after closure. Also, only very slight differences in sugar concentrations were found in the various levels of sirup examined in these cans.

Upon the basis of the results obtained, a very definite difference in heat penetration exists between cans of sweet potatoes to which sugar is added dry and to which sirup is added. If statistical analysis can be considered valid, considering the somewhat limited number of observations, the probability of the difference in sterilizing values being zero or less is quite remote. The rate of heat penetration in general was found to be slower at the bottom of all the cans examined than at the can centers. This condition is indicative of the existence of convection currents in both the cans to which the sugar was added dry or in sirup form. The difference in heat penetration noted above apparently is only partially due to the thermal insulating effect of the layer of undissolved sugar in the bottom of the can. Under the conditions of the test in which the maximum possible thermal insulating effect of this mass of sugar was obtained, the sterilizing value of the process at the bottom of the can was reduced by only about 16 percent, or approximately one-half the reduction observed when the sugar was added directly to the can. As previously indicated Magoon and Culpepper observed a retardation of the convection currents in cans of sugar solutions of high density apparently due to the greater viscosities of these solutions. It appears that the presence of the more concentrated viscous layers of sirup found near the bottom of cans of sweet potatoes to which dry sugar had been added also act similarly to retard the rate of heat penetration in these cans.

Part II of this article, dealing with the investigation of the bacteriological aspects of the use of dry sugar in sweetening foods canned in sirup, will be published in the March issue of FOOD INDUSTRIES.—THE EDITORS.

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Progress in Processing Salt Stock

Part II—Need for lower production costs and for more uniformity in quality made it necessary to develop radically different equipment and methods

By W. G. WORMLEY, *Mt. View, Calif.*

So many unfavorable features centered in the use of the round stationary pickle processing tank and the older system of processing that it became necessary to develop radically different equipment and methods. Of the forces which compelled this step, two were outstanding: The necessity for lower production costs and the need for better uniformity of quality.

Portable, or at least movable, process tanks offered considerable possibility for economy in the utilization of factory space, and this in turn was a possibility through the advent of the heavy-duty lift truck. As we finally worked it out, 4 by 6-ft. platform skids were constructed, heavy enough to carry 30 bu. of pickles and the necessary brine or water, plus an oval tank made of cypress. Dimensions of the tank were 5 ft. 7½ in. long by 4 ft. wide (outside dimension) by 38 in. deep (inside dimension). This was fitted with a ¼-in. laminated wood lid or cover. In one end of the tank and as near to the bottom as possible was inserted a wooden double-end spigot of 1-in. inside diameter. This is standard vinegar equipment and easy to obtain. Placed on the platform skid, this oval type of tank made an ideal piece of equipment. (See Fig. 1.)

The oval shape was selected because of the convenience of moving it endways, for a round tank of the same capacity would require wider aisles, alleys, corridors or doors.

In general the use of portable process tanks involves a combination of materials handling and processing in which the process tank is moved to the tank house to pick up its load of brine stock, thence to a processing "station" or room to receive water, steam, agitation, and so forth, after which it is transferred to another department for "finishing" the pickles in the same tanks. Hence, instead of the usual large process tank room, with its pitted concrete floors—a wet and unattractive place at best—there is a small locality where a few tanks, usually about five, are assembled side by side for processing.

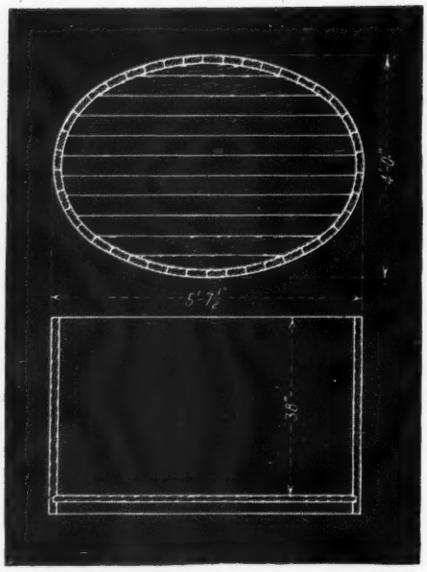


Fig. 1. Drawing of oval cypress tanks for pickle processing and curing.

This locality or processing station (Fig. 2) is provided with a waterproof draining floor only large enough to accommodate conveniently the requisite number of tanks on their skids. Waterproof floors for the rest of the room are, however, desirable because tanks may become leaky.

For economy of piping and heat losses from steam pipes, the processing station should be as close to the boiler room as possible. Along the wall are 2-in. steam and cold-water lines, with a tee in each line every 6 ft., turned downward instead of horizontally. Steam tees are bushed down to ¾ in., while water tees are bushed to 1¼-in. pipe size.

On each ¾-in. steam line is a globe valve and a Pemberthy steam siphon, the delivery being piped down so that it conveniently clears the tops of the process tanks when they are backed endways against the wall in the lifted position of the truck. On the suction side of the siphon, a 1½-in. steam hose is attached by a snap coupling (air-brake coupling), the hose being long enough to extend from the siphon to within 10 in. of the bottom of the process tank. To the end of the hose is fitted a wooden strainer made from a 10-in. block of cypress, 2 in. in diameter, with a 1-in. hole bored through the full length of the block but with the far end plugged. All sides of the block are drilled with ⅜-in. holes, ½ in. apart, making as many holes as possible in this wooden strainer. A stainless steel strainer may be used.

Each outlet of the water line is equipped with a quick-opening gate valve, 1¼-in. size, and 3 ft. of 1¼-in. water hose.

Gaging each portable process tank is the next step. It must be done ***accurately*** in units of 36 gal., or 300 lb., of water, and a gage board is made of clear pine lumber on which is marked the successive 36-gal. lines. Marking can be done by a small saw-cut or by burning a line across the board. Each tank must have its own gage board unless the tanks are made so accurately that all are exactly alike. (If, perchance, the pickler wants to weigh the tank at every operation, the gage board can be eliminated. But weighing will require transporting the tank and skid to the scales every time an addition is made, and the truck may not always be handy. Gaging is the more simple method.) The tanks are now ready for use.

Operating Procedure

First, place the correct amount of water, as called for in the formula, into the tank. This can be either measured by the gage board, or it can be weighed. Then the process tank on its skid is trucked to the salt-pickle storage house where the requisite amount of drained salt pickles (already assorted to proper size) is dumped into the water in the tank. Here again the volume of the pickles can be accurately determined by the use of the gage board, or if one prefers to use weights the platform scales can be used. My own preference for practical operations is to depend on volume and use only the gage board.

Next, back the tank against the wall of the processing station under the steam and water outlets. Attach the steam hose to the cypress strainer block and force it down to the bottom of the pickles. The other end of the hose has already been connected to the suction inlet of the steam siphon by the snap coupling. Steam is now turned on to the siphon, thus drawing cold water from the bottom of the tank, heating it and discharging it to the top of the tank. In about one hour the tank will be heated to the proper temperature with a minimum amount of steam. Consumption of steam for one of these oval portable tanks is about one-third that needed for the old round tanks, and the time required per tank is much less. With the five outlets at the processing station it is possible to begin the processing of five tanks per hour, or 40 tanks per 8 hours. This amounts to 1,200 bu. of pickles per day with only five steam and water outlets. To accomplish the same results in the old way one would need 20 steam and water outlets plus processing space that could never be used for any other purpose.

Of the older form of equipment, only the cypress paddle is retained. This is used for agitating the pickles in the tank, and I have never yet found anything better.

Processing Instructions

Fresh water, to the amount of 1,500 lb., is placed in a clean empty tank. This amount is based on the assumption that the brine stock is in equilibrium with its brine and that the brine tests 60 deg. Sal. Furthermore, this method of processing is based on good salt stock—not "junk." The only easy way to ascertain the amount of salt in the brine stock is to determine the density of the brine in which the pickles are kept. But in utilizing this method, it is necessary to be sure that the pickles have been in the brine long enough to have the same amount of salt inside as in the brine; in other words, to have reached the equalization point. If the brine tests some other figure, the proper amount of water can be computed from Table I.

To the 1,500 lb. of fresh water in the tank is added 1,500 lb. of salt stock. This can be determined by actual weighing of the pickles before dumping them into the water, by weighing the tank, skid and truck before and after adding the pickles or by displacing 1,500 lb. of water in the tank, which will double its depth. The last method, *i.e.*, determining the volume of the pickles rather than their weight, is to be used with caution since it is based on a wholly different figure. And while it may be used satisfactorily it should be remembered that weight of pickles and their physical volume are not the same. It further requires different amounts of water from the amount used where actual weights are employed. In either event it is important to test the strength of the brine from which the pickles are removed just prior to their removal.

After taking the tank to the processing station or room and heating the water to 80 deg. F., the tank may, if desired, be temporarily set to one side while another tank is being heated, but the first tank must be returned and reheated if the temperature falls below 80 deg. F. And the pickles must be thoroughly agitated at least every hour. This processing must be kept up until a test of the water in the tank shows that it has soaked enough salt out of the pickles to reach an equilibrium, or

(*Turn to page 73*)

Table I—Processing Directions for Salt Stock.

Weight salt stock, (lb.)	Brine test, (deg. sal.)	First process water needed (lb.)	Equalization point (deg. sal.)	Second process water needed (lb.)	Final test (deg. sal.)
1,500	60	1,500	30	750	18–20
1,500	59	1,450	30	750	18–20
1,500	58	1,400	30	750	18–20
1,500	57	1,350	30	750	18–20
1,500	56	1,300	30	750	18–20
1,500	55	1,250	30	750	18–20
1,500	54	1,200	30	750	18–20
1,500	53	1,150	30	750	18–20
1,500	52	1,100	30	750	18–20
1,500	51	1,050	30	750	18–20
1,500	50	1,000	30	750	18–20
1,500	61	1,550	30	750	18–20
1,500	62	1,600	30	750	18–20
1,500	63	1,650	30	750	18–20
1,500	64	1,700	30	750	18–20
1,500	65	1,750	30	750	18–20
1,500	66	1,800	30	750	18–20
1,500	67	1,850	30	750	18–20
1,500	68	1,900	30	750	18–20
1,500	69	1,950	30	750	18–20
1,500	70	2,000	30	750	18–20

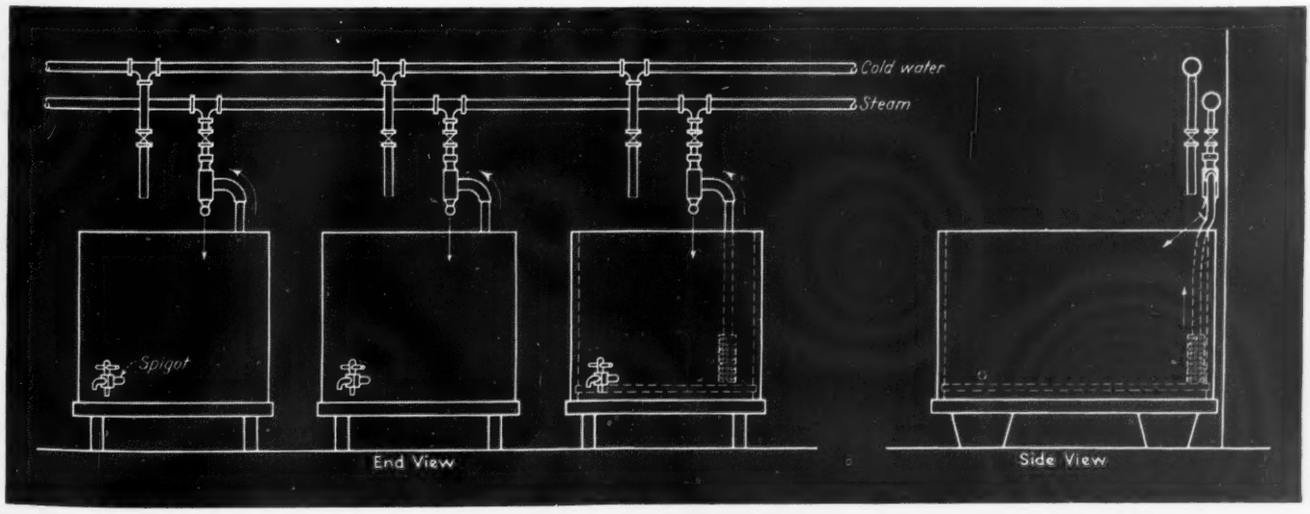


Fig. 2. Sketch of oval pickle processing tanks at processing "station," showing water and steam supply lines. Supported on skids, oval tanks are portable, their shape permitting movement through doors. Lift trucks transport each tank to tank house for brine stock, to processing station for water, steam and agitation, then to "finishing" department. The portable tanks make for better economy in utilization of available factory space.

Your Market is Shifting

Part I—Institutional market for food increases in importance as prepared-meal outlets increase greatly in number and sales volume. Prepared-meal outlets not reported in census of distribution are important market.

By IVAN C. MILLER, *Distribution Editor, "Food Industries."*

THE administration has budgeted the 1941 Federal expenditure at 17½ billion dollars. The actual appropriation may be more or less—probably less. However, any amount approaching 17 billion dollars is a huge sum of money, rather beyond conception in the human imagination. Whatever the appropriation, huge as it is certain to be, it will not greatly exceed the nation's expenditure for food. In previous years, the nation's food bill has annually exceeded all other national expenditures—housing, clothing, transportation, amusement and the cost of national government, except during 1918-19, when government expenditures exceeded food purchases.

Unfortunately, there is no record of retail food dollars before the 1930 Census of Distribution—no adequate statistics which permit measuring markets or trends before that time. From 1930 to the present, including the 1940 preliminary report, there is a worthy accumulation of facts upon which markets and trends can be statistically estimated with a fair degree of accuracy.

According to the 1930 Census of Distribution, sales in food stores during 1929 amounted to $10,837,421,000. Food store sales were less in 1939 by 6.3 percent, amounting to $10,152,332,000. Though less in total volume, food store sales in 1939 represented a larger portion of total retail sales than during 1929, accounting for 24.2 percent that year compared to 22.7 in 1929.

The Census of Distribution reports another retail outlet for food—prepared meals sold through eating places. Prepared meal sales in 1929 were reported at $2,124,890,000, as compared to $3,520,985,000 (according to the preliminary 1939 reports) bringing the total retail food sales for the two periods ten years apart to

$12,962,231,000 in 1929
$13,673,317,000 in 1939

These figures, of course, cannot be taken at face value. 1929 was a Prohibition year. Whatever bootleg liquor was sold by eating places that year was reported, if at all, as food sales. The 1939 report of sales of eating and drinking places includes, of course, a considerable volume of retail sales accounted for by the sale of alcoholic beverages, not foods.

If no consideration is given to the volume of liquor sales mixed in with food sales in the report for both years, food store sales increased from 22.07 percent of retail sales in 1929, to 24.2 percent in 1939, while prepared meal sales increased from 4.33 percent to 8.4 percent. Together, retail food sales through the two types of outlets accounted for 26.4 percent of total retail in 1929 and 32.6 percent of total retail sales in 1939—a very definite increase.

When the retail census figures are placed on a per capita basis, the whole picture changes. The 1929 per capita expenditure for food through retail stores was $88.20, dropping to $77.20 per person in 1939. This is only a drop of 12½ percent in per capita purchases through food stores compared to a 20 percent drop in all retail purcrases. Sales of prepared meal outlets moved in the opposite direction. The per capita prepared meal sale in 1929 was $17.30 per capita. In 1939, $26.80 per capita. America, it must be remembered, is on wheels, eating fewer meals at home, more meals at easily accessible eating places (FOOD INDUSTRIES, February, 1939, page 80).

In past years FOOD INDUSTRIES has

Average Per Capita Consumption of Principal Food Products, 1920-37[1]

(Pounds per capita per year)

Commodity or group	1920–24	1925–29	1930–33	1934–37	1920–37
Cereal products	229	226	211	196	217
All potatoes	178	164	156	157	164
Sugar and sirup	106	118	107	110	110
Dairy products:					
Milk and cream[2]	315	324	337	328	328
Manufactured[3]	40	45	46	49	45
Butter[4]	16.8	17.5	17.9	17.2	17.3
Fruits:					
Fresh	179	192	184	189	186
Dried	6	6	5	6	6
Vegetables	135	148	154	169	151
Lean meats and fish	138	133	129	126	132
Eggs	28	32	32	30	30
Beans, peas, nuts	11	14	16	16	14
Fats (excluding butter)	44	47	47	45	46
Coffee, tea, spices, chocolate	16	17	18	19	17
Total food	1425	1476	1442	1440	1446

[1] Data compiled by American Butter Institute, Chicago.
[2] In terms of whole milk.
[3] Including butter.
[4] From *The Dairy Situation* August, 1938 (added). This item is included also under "Manufactured."

Statistics of Retail Food Sales, 1929-1939

Based on Census of Retail Distribution (1939 preliminary report)

	Sales volume		Percent of total retail sales		Dollar sales per capita		Percent of retail food dollar	
	1929	1939	1929	1939	1929	1939	1929	1939
All retail	$49,114,653,000	$42,023,818,000	100	100	$400	$320	.....	.....
Food stores	10,837,421,000	10,152,332,000	22.07	24.2	88.2	77.2	83.8	74.25
Prepared-meal outlets*	2,124,890,000	3,520,985,000	4.33	8.4	17.3	26.8	16.4	25.75
Restaurants, etc., not including drinking places	2,124,890,000	2,135,963,000	4.33	5.07	17.3	16.25	16.4	17.4
Food stores and Prepared-meal outlets	12,962,311,000	13,673,317,000	26.40	32.6	105.50	104.00	100	100.
Food stores and eating places, not including drinking places	12,962,311,000	12,288,295,000	26.40	29.28	105.50	93.45	.....	.....

* Prepared-meal outlets as designated by the Census of Retail Distribution include restraurants cafeterias, lunchrooms and road-side stands. Prepared meals sold and served by hotels, drug stores, department stores, railroads, steamships, asylums, prisons, Army and Navy, public schools, industrial plants, clubs, fraternities, Y.M.C.A's etc., are not included.

The variety of foods, from soup through hot dishes to desserts, in the large public school cafeteria is much the same as that offered in a commercial cafeteria. The planned meal and single dishes, supervised by dietitians, are usually sold as near as possible to cost. The school cafeteria is an expanding market for foods.

repeatedly reported facts concerning the per capita consumption of foods throughout a period of years. These reports were based on pounds of food consumed. According to these tables and charts, the pounds of food consumed per person has varied but a few percent over many years, regardless of pendulum swings in retail sales volume and accordingly wide variations in dollars spent per capita for food.

The 12½ percent drop during ten years in per capita expenditure for food through food stores can mean one of two things (providing the ratio of sales of food to non-food in food stores remained the same in 1939 as 1929). Either the price of retail foods was considerably lower for 1939 than 1929, a consideration encouraged by the growth of the self-service grocery store, or retail food stores are accounting for a smaller proportion of total food sales.

For whatever they may be worth statistically, the census figures for food store sales and prepared meal sales for 1929–1939 indicate a trend of the food dollar toward the prepared meal against the home cooked meal. In 1929 food stores received 83.8 percent of the retail food dollar; 74.25 percent in 1939. Prepared meals accounted for 16.4 percent in 1929 and 25.75 percent in 1939.

In considering the possible outlets for the products of food manufacturers, the census of retail distribution is but a comparative measure—an index reporting fluctuations from year to year of one group of outlets for food, retail outlets. There are many large and very important outlets for foods not included in the retail census, nor in any other government tabulation. These markets not covered by the retail censuses will be discussed in this and following issues of FOOD INDUSTRIES.

In 1890 there were 200,000 children attending high school. Today, with little more than double the total population of 1890, forty times the number of children attend high schools, both private and public, a total of more than 8,000,000. Grade schools likewise have experienced a tremendous increase in enrollment—in total numbers and in proportion to population.

The growth in school attendance to a present enrollment of between 36 and 37 million (including approximately one million teachers and instructors) would be of little significance to food manufacturers were it not for the fact that with this growth has come consolidation of schools into larger and larger units, each providing for the education of children over a large area. The school cafeteria or lunchroom has been the result.

Though these school cafeterias generally provide but one meal per day, the total number of meals is both staggering and growing. It is a market to be coveted.

According to Dr. Mary DeGarmo Bryan, director of institutional management, Columbia University, there were, in 1931, 64,500 school cafeterias. New cafeterias at that time were being added at the rate of 7,500 annually. In addition to the cafeteries in 1931 there were 11,500 schools serving single hot dishes. It is estimated that at least half, and possibly more, of the 37,000,000 school attendants, including teachers and instructors, in this country purchase part or all, or are provided with a part or all, of their noon meal in school cafeterias. Four to five million free meals or supplementary feedings per day are served to children at the expense of national or local government.

Even in localities where consolidation of schools, necessitating long distances traveled to and from school, has not provided incentives for school feeding, school lunch rooms or cafeterias are, nevertheless, the trend. This to a large measure is the result of our recently acquired knowledge of vitamins and food minerals, of diet deficiencies and resulting effect on health and mental capacity. The approximately 5,000,000 free meals, or supplementary feedings as the case may be, provided public school children at the expense of local or national government is also in line with a trend. This feeding reflects the determination on the part of government that school children—all of them—shall receive at least one adequate balanced-diet meal per day. School feeding will increase.

Though the dollar volume of the school meal may be small (the meal is usually served at cost) the aggregate is large. A minimum-cost balanced-diet meal may run as low as 8 cents, averaging probably much higher. This is the minimum-cost plate lunch or hot meal in low-income areas. The average meal in high schools in some areas averages between 20 and 30 cents.

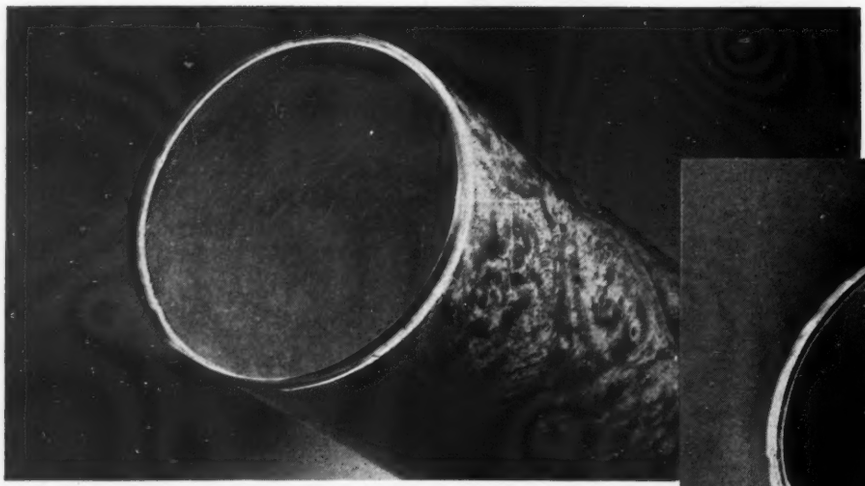
More than half of the school cafeterias or lunchrooms are supervised by a dietitian, usually a teacher with home economics training. Soup and milk are items occurring most frequently on public school menus. The milk may appear as milk, chocolate milk drink or cocoa. And soup, especially in large schools, is frequently canned soup to which, occasionally, fresh vegetables are added. Sandwiches, usually made from baker's bread with a variety of fillings, are important items on the school menu.

When the school is large enough to provide a hot dish on the noon lunch, the hot dish includes vegetables, frequently canned vegetables. Meat in the form of stews, meat balls, and so forth, is frequently a part of the hot dish. Salads vary in importance according to the size of the school lunch room. Desserts cover a wide range, including those made from rice, tapioca, gelatine and prepared dessert mixes, dried and fresh fruits.

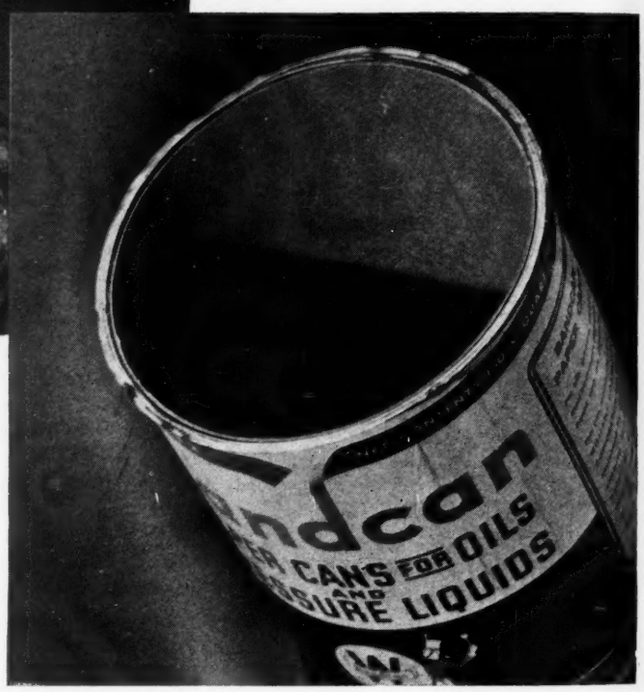
The school cafeteria is widely distributed over the country. There is one or more within reach of every dairy and bakery. And purchasing is local.

Paper Can That Can Take It

Said to withstand 105-lb. pressure and 360-deg. temperature. Can be made moisture-vapor proof. Has metal ends attached to metal bands wound into ends of laminated walls. Closed with can-closing machine



A ½-in. perforated metal band is convolutely wound into ends of five-ply paper cylinder as the cylinder is laminated. The metal bands project about ⅛ in.

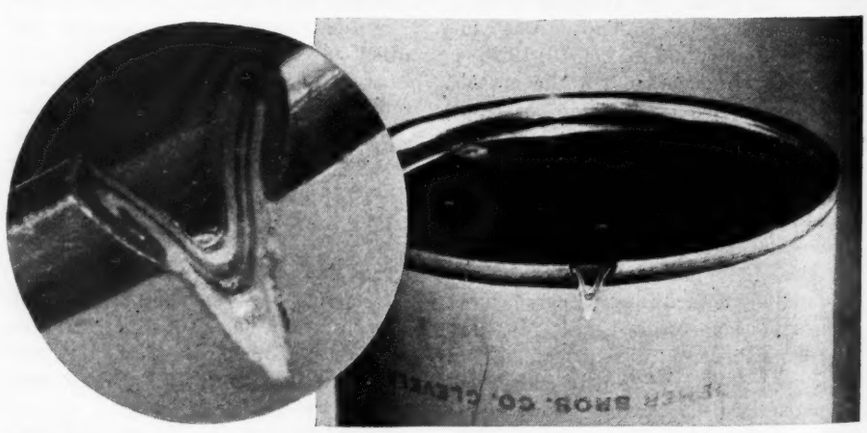


The projecting metal bands are flanged in the same manner and on the same type of machine as cans are flanged on. Then the metal top and bottom are seamed to these flanges on either end just as with a metal can.

A NEW TYPE of container will soon be made available to manufacturers. The "Bandcan" manufactured by Williams Container Corp., New York, is a paper-walled canister with metal top and bottom. The Bandcan under test is reported to have withstood temperatures as high as 360 deg. F. and internal pressures as high as 105 lb. per square inch.

There have been many attempts to produce a paper container which would meet at least some of the requirements of the tin can or glass jar. Most such paper containers have had limited application to food products. Few of them could withstand high pressures, high temperatures and rough handling. Few were moisture-vapor proof over long periods of time.

One of the chief difficulties in constructing a paper-walled cylindrical container with metal top and bottom was due to the different coefficient of expansion of paper and metal. This difference has made it difficult to maintain a pressure-tight union between the paper and the metal on most of the earlier designs of such containers. The sealing of the top of the Bandcan to the side wall is effected by the insertion of a metal band convolutely wound into the side wall as it is laminated, and the metal end is seamed to this metal band in the same manner as in the closing of a metal can.



The paper can with metal end attached. The V-notch filed into the rim shows the construction of the joint between the top and sides of the can. At left is an enlargement of the V-notch to show the details clearly.

The side walls of this container are made by rolling adhesive-coated paper into a five-ply cylinder. This is done under high pressure in continuous automatic machines. The bond made by the adhesive under pressure converts the five layers of paper into the equivalent of a solid wall. Light-gage perforated metal strips are rolled in with the paper at the ends of the cylinder as the container

is formed. These metal strips project out approximately ⅛ in. from each end of the finished cylinder.

As the cylinder is formed under pressure, the perforations in the metal anchor into the fiber of the paper. Also, the adhesive permeates the perforations to make a further bond between the two adjacent layers of paper. The projecting metal edges are then flanged, and a metal bottom is attached to the flange on one end of the cylinder, as is done in making tin cans. The closure is applied in the same manner to the flange on the opposite end. This container-closing operation requires no change in the food-plant production line.

commercially as a container for carbonated malt beverages requiring retention of CO_2 under pressure and sterilization and pasteurization in the container. In cases where it is necessary to prevent the contact of contents with metal, the metal end may be coated, or surface-coated paper-lined metal ends may be used, these being attached to the paper walls in the same manner.

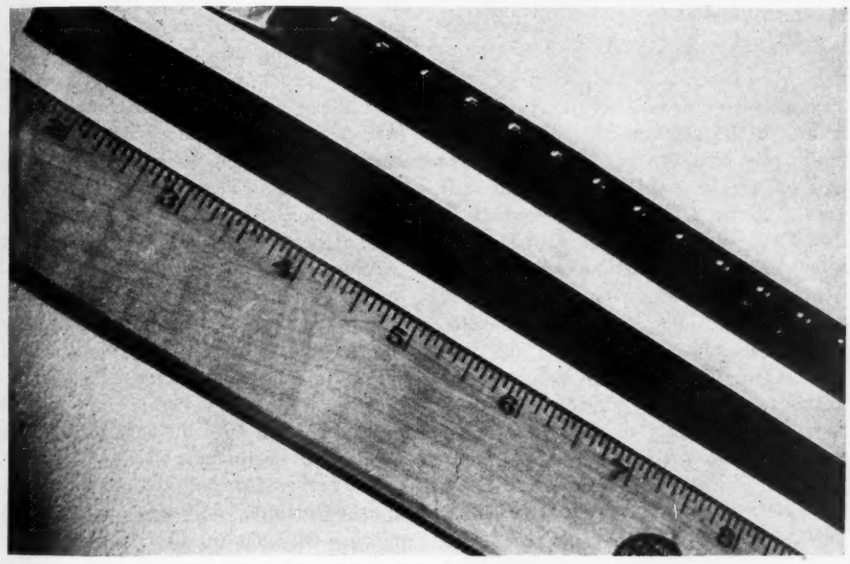
The top or bottom of the container can be equipped with a transparent window to permit inspection of the product. And the container can be formed into a square, oblong or oval shape.

The Bandcan is suitable for food

temperatures above the sterilization point.

The cost of this container, which of course varies with its size, shape and the type of contents which it is to protect, may effect a saving of from 15 to 25 percent over all-metal containers of equivalent volume, according to the inventors. This type of container can be fabricated in the food plant or purchased already fabricated.

The Bandcan, as it gains acceptance, may develop into an important container for many food products which do not have to be retorted. If developments in the present national emergency reduce the available supply of tin and require conservation of this strategic material, this container may become a very important instrument in effecting that economy.



Light-gage ½-in. metal strips are perforated and then rolled in with the paper in forming the side walls. The perforations of the metal anchor into the fiber of the paper, while the adhesive bonds the layers of paper through the perforations.

The paper wall may be either cylindrical, as here, or oval or square. It may be constructed for a compression-lid closure, as this one, or for a seamed-on lid. Top or bottom may have a transparent window.

One advantage of this type of container is the fact that a lithographed label can be applied during the forming operation, being bonded to the outside of the container and rolled smooth under pressure.

May Be Used for Foods

The container may have application to a variety of food products. The inside of it may be sprayed with any type of coating required to protect the contents. The coat will naturally vary according to the nature of the contents to be preserved. It can be made oil- or grease-proof. In fact, it has been tested as a lubricating-oil container by some of the major oil companies—tested in service through company filling stations.

Through the application of an interior coating, the container may be made moisture-vapor proof for the storage of hygroscopic material, including foods of this type. It is now being tested

products not requiring retorting, including liquid or solid foods packaged at

Where it is necessary to protect the contents of the can from contact with metal, the top and bottom of the container may be formed with a liner of paper coated with a protective surface.

Pectin as Aid in Freezing Fruits*

Part II—Its applications in the freezing preservation of peaches. Experiments give contradictory results.

By GEORGE L. BAKER, *Delaware Agricultural Experiment Station, Newark, Del.*

THE application of pectin in the prefreezing treatment of peaches gave contradictory results, so much so that it is with some hesitation that the results are discussed at this time. Only three varieties were used, the Early Redbird (white), the Delicious (white) and the Elberta (yellow). The differences may be entirely due to the varietal factor, and when pectin is used on a larger number of varieties, more definite values will be disclosed.

As a result of the experiments with strawberries, the prefreezing treatments of peaches were limited to powdered pectins or mixtures with other dry substances. The exceptions were calcium chloride and citric acid. The calcium chloride was used in some of the treatments as a dilute solution for dipping the peaches previous to pectin or pectin mixture treatment.

The peaches were prepared by peeling (without the use of acid, lye or heat) as carefully and as quickly as possible. After slicing they were immediately given the various experimental treatments and allowed to stand for periods up to one-half hour before freezing at –10 deg. F. After 24 hours the samples were placed on glass plates and exposed to the atmospheric conditions prevailing in the laboratory. Attractiveness and general appearance were taken as the guide in grading the samples. The amount of liquid which seeped out was not considered in grading samples.

Although the experiments included only the three varieties named above, the results were such that the two white varieties seemed to fall into a distinct classification and to differ greatly from the reaction of the Elberta peach to prefreezing treatment.

White Varieties

The Early Redbird, which ripens during July in Delaware, responded to treatment with low-methoxyl pectins in a manner similar to the sliced strawberries. Prefreezing treatment with 1 part pectin (5.22 percent methoxyl content) and 20 parts sugar per 100 parts sliced peaches gave a product which was very attractive even after six hours exposure to the atmosphere at 85 deg. F. While the presence of 1 percent citric acid by weight (which lowered the pH from 3.49 to 2.75) gave a product of attractive but unnatural appearance, other treatments, including smaller amounts of the acid, cane sugar alone or the pectin alone, gave poorer results.

The Delicious also showed up well after thawing when it had received prefreezing treatments with a low-methoxyl pectin and sugar. However, when the sliced peaches were dipped and allowed to stand in an 0.18 percent calcium chloride solution for one minute, either with or without further treatment, upon defrosting the slices held their firmness, shape and also their natural color for a longer period than slices treated by any other method. This is a confirmation of the observations of Kertesz [4]. Up to 10 parts sugar per 100 parts sliced fruit did not upset the improvement in appearance resulting from the use of calcium chloride. However, it was found that the concentration of calcium chloride had to be carefully controlled or brown spots appeared.

Elberta Variety

In direct contradiction to the results with these white-fleshed peaches, the use of calcium chloride alone upon the Elbertas showed little if any improvement over the control. Another contradiction was found with this yellow variety in the type of pectin which gave the best results; instead of low-methoxyl pectins, the high-methoxyl pectins were of greatest value. The pectins with a methoxyl content above 9 percent proved best. The low-methoxyl pectin did prevent loss of juice but detracted greatly from the general appearance of the fruit. Browning seemed a more important factor in appearance than loss of juice. Ease of dispersion and solubility, in agreement with Cowgill[3], were evidently the characteristics necessary in pectin for improving the appearance of defrosted peaches. Commercial pectins with these properties were found to be just as valuable as the purest of laboratory samples; the amount of ash was not a factor. The most advantageous combination proved to be 1 part pectin and 10 parts sugar per 100 parts sliced peaches. The quantity of pectin required varied with the grade, as low as 0.5 percent of a 100 grade product showed a definite value. Quantity used will be a matter of choice. No correlation was found between the natural pectin content of the fruit and the amount of pectin employed.

The reason for the existing differences in the manner in which the sliced peaches with a white flesh and the sliced peaches with a yellow flesh responded to experimental treatment cannot be explained. Until further experiments have been undertaken, a general formula for the prefreezing treatment of peaches with pectin cannot be recommended. It is evident from the experiments that pectin is of value and may be used, if desired, to lower the concentration of the high sugar sirups now used in the freezing of peaches.

Other Fruits

While, without a doubt, pectins will be found of value in the prefreezing treatment of other fruits, an extensive survey has not been made. A low-methoxyl pectin has been found to prevent entirely the loss of juice from cherries which otherwise lost juice up to 25 percent of their weight. On the other hand, experiments so far concluded indicate that no treatment at all or the use of sugar in the prefreezing treatment of red raspberries and blackberries is to be preferred to the use of pectin.

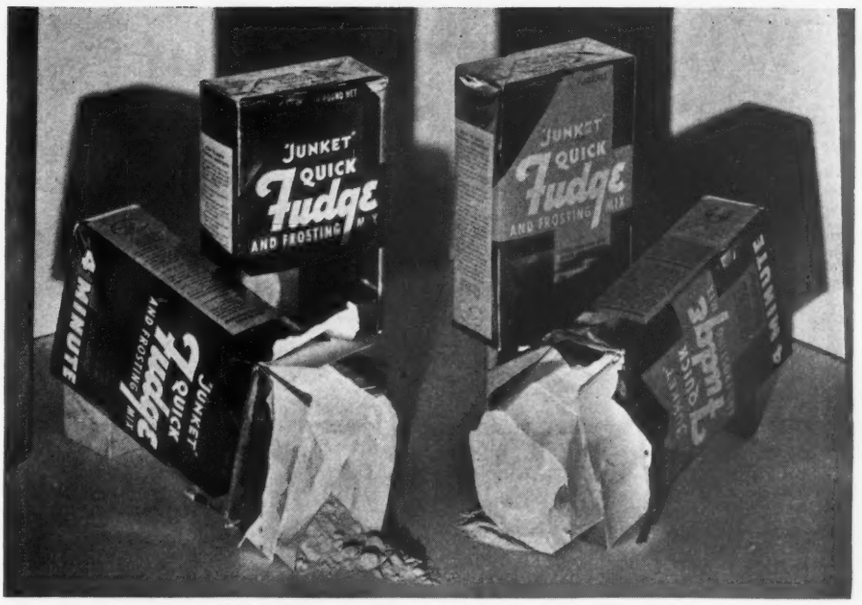
(*Turn to page 97*)

* Published with the approval of George L. Schuster, Director, Delaware Agricultural Experiment Station. The original title of the paper is "Pectin as an Aid to the Freezing Preservation of Strawberries and Peaches."

[3, 4] For references see Part I, FOOD INDUSTRIES, January, page 56.

Color Identifies Content

CHR. HANSEN'S LABORATORY, INC., Little Falls, N. Y., has recently supplemented its chocolate-flavored quick fudge with an additional quickly prepared confection or cake icing—"Penuche Flavor 'Junket' Quick Fudge." And it has introduced both in new packages. The new package consists of a paper sack within a sealed folding carton surrounded by a tight-sealed, outer, paper-backed, metal-foil wrapper. The background on both packages for the four-minute quick fudges is gold. The difference in content is designated by a different color lithographed on the label, as well as by printed designation. Dark brown is the distinguishing color on the package for chocolate-flavored quick fudge and light brown or biege is the color used for penuche.



New Packages & Products

To Be Cooked in Package

HOLIDAY PLUM PUDDING was introduced this year by Hamilton, Ltd., San Diego, Calif., packaged in transparent rubber hydrochloride bags. The transparent wrap makes an attractive holiday package, permitting inspection of the contents. Instructions accompanying the pudding directs purchaser to prepare the pudding for serving by suspending it inclosed in the transparent wrap for 45 minutes in boiling water. Only then is the original wrapping to be removed. The pudding is then ready for use.

Unique Foods in Gift Jars

A LINE of unusual foods has recently been placed on the market packaged in Mexican pottery, jars, pots and other containers which in turn are packaged in gay gift-suggesting outer cartons. Among the products in this line are blueberry and lemon marmalade, Maine codfish cakes, Maine Yellow-Eye baked beans, New England brown bread, Indian pudding, Maine clam chowder, Creo Gumbo, Jambalaya, red snapper bouillon, candied yams in heavy sirup, Philadelphia scrapple, honey jellies, pickles, relishes and rare teas. These "Cresca Brand Early American" foods in the gift-suggesting packages are distributed by the Cresca Company, located in New York City.

What Europe Does To Save Tin

Measures taken to save tin for defense purposes affect food packaging and suggest what may be ahead for American food manufacturers

By GEORGE E. DOYING, Jr., *Food Industries, Washington.*

WHAT will be the fate of tin for cans as the present defense program gets into high gear and is—as it inevitably will be—expanded beyond today's proportions; or in the event the nation does get into a "shootin' war?" The man wise enough to supply categorical answers to such contingencies hasn't been born—and won't be.

There are, however, some "next best" answers to be found in measures undertaken by other nations which are facing shortages of tin for their armament factories.

To begin with—so as to get a clear picture of the facts in the case—it should be remembered that the original prevailing policy for defense was that preparedness was to be secured in this country without infringing upon the normal daily lives and affairs of the nation and its citizens. This was the general, overall policy, of course, and no one believed or expected that it could be carried out to the letter. In recent weeks, however, there has been a sharpening demand—both within and without the offices of those charged with directing national security—for radical alteration of that objective.

It is now agreed that this country can no longer afford the slogan of "business as usual" wherever and whenever private requirements interfere with or slow up defense preparations. How fast this new concept will replace the old depends upon a variety of things, including the public reaction. There will be no overnight shift, of course, but rather a cumulative series of events that will recast the program.

Stocks of Tin

The problem of stockpile procurement of tin has been, and at this writing still is being, approached from the original point of view that preparedness in the raw material phase of the job must be broad enough in scope to supply both normal and defense requirements. Without going into detail—and detail here is unavailable as is most of the specific blueprint data of defense planning—it can be said that the tin stockpile program is progressing better than had been really expected, probably as good as had been hoped. Monthly imports set successive new all-time high levels for most of the latter half of 1940. Stocks in the country are probably at a record peak, more than enough to last a year for normal demands.

Plans for a tin smelter in this country, and the recent deal of Reserve Metals Co., the RFC subsidiary, signing up sufficient low-grade Bolivian ore to assure 12,000 tons of fine tin a year (of which Britain may take up to one-third) for the next five years, combine to make the picture look even brighter.

All this is on the affirmative side of the ledger. How about the negative side? Well, the huge further expansion of the preparedness program under way necessarily shortens the range of requirements that could be met by present supplies—on hand and prospective. Unfavorable developments in the Far East threatening or curtailing future replenishment of stocks would force greater consideration of insuring adequate supplies for munitions. Also, in the light of the shifting emphasis on how to meet defense problems, a natural sequence could be to say that a two-year stockpile for normal and defense purposes can also be called, say, a three-year or four-year supply for defense purposes if other uses were pared to the bone.

With this in mind, let us turn to what has happened and is happening in the nations actually engaged in the war. It is there we can probably find those "next best" answers to what can happen here!

England Saves Tin

The first and most important fact which develops in a search of this field is that England is rationing tin now and has banned its use in cans for an impressive list of commodities—England, which with Holland, controls the bulk of the world's supply of tin ore! The reason isn't hard to find—even with vast ore resources at her disposal, England needs to conserve shipping space and money credits, and, perhaps above all, must remain alive to the possibility that trouble in the Far East might upset the best laid plans for a steady inflow of supplies. Normal use of tin cannot be permitted today even when there is enough because tomorrow there might be none to feed the munitions factories! Despite tin smelter, despite Bolivian ore, despite stockpile, America's supply line hangs by just as slender a thread.

The British tin conservation regulations are stringent and specific. They flatly ban the use of containers made of "controlled materials" (tinplate, tinned sheet, black plate, silver-finished plate, terneplate, terne sheet, lead-coated sheet, black-coated sheet or galvanized sheet) for 44 types of commodities. The list includes (just to name a few): cat and dog food, chicken, edible chocolate, crab and shrimp, drippings, fats, lard, fruit puddings, face powder, petrol (gasoline), honey, cigarettes, coconut oil, tea.

Other food products do not escape the controls, however. When "controlled materials" containers are used for products (except certain fish items) in the British Standard Schedules of sizes of tins and cans, the containers must be of specified size or larger, and of a type in common use between Sept. 1, 1939, and July 20, 1940. The Standard Schedules cover all food products except such commodities as sirups, invalid and baby foods, condiments, dried fish, extracts, liquid beverages and baker's sundries.

As a result, retailers are receiving their supplies of such products as potato chips, toffee, boiled sweets, cocoa, drinking chocolate and coffee in large tins *which must be returned after their contents are sold to the public in smaller containers of other materials.*

Another regulation prohibits individuals from acquiring or disposing of any

(*Turn to page 97*)

Hints and Hurdles

Britain Changes Food Habits To Meet Wartime Emergency

EMERGENCIES arising in Britain which have brought about changes in food distribution and food consumption may never have to be faced in this country. However, they are not unworthy of contemplation.

Britain has appointed a director of communal feeding to supervise the operations of a number of privately owned plans already under way. An official plan will also soon be in operation. Most feeding schemes are operated in conjunction with big housing estates, blocks of flats offering a hot meal for sixpence (10 cents in our money). The government recently announced that 600 communal feeding centers have been open in London to feed those bombed out of their homes but not injured.

The London County Council is sending mobile kitchens through London suburbs, giving open-air demonstrations to educate women in the use and preparation of foods, instructing them in balanced diets and menu planning. Instructors accompanying the mobile kitchens are trained by the Women's Voluntary Service.

Four British companies (creameries and shortening plants) have recently pooled resources and are operating a bakery service with the objective of meeting the bakers' wartime problems. A full-time research laboratory offers free service to any baker in solving any of the wartime baking problems.

British bakers have organized a mutual-aid pact whereby any baker whose premises suffer from air-raid damage may call upon competitors for aid.

Probably some of these and other cooperative endeavors will remain after the emergency is over.

Milk Sales Going Up

NEW YORK CITY is preparing to supply 30,000,000 quarts of milk at a penny a glass to 800,000 of the city's 1,100,000 public school pupils. Chicago is following a like program. The Surplus Marketing Administration of the United States Department of Agriculture will defray the remaining expense of this low-cost method of milk feeding. This will unquestionably increase the consumption of fluid milk in both New York and Chicago. If applied on a national scale it will certainly result in increased national milk consumption.

American Stores has recently introduced an innovation in the packaging of gelatine, replacing the folding box which stacks conveniently on the shelf with a counter display carton containing gelatine packaged in envelopes. Four small envelopes of gelatine are packaged in each large envelope.

Cloud with Silver Lining

SHORTLY AFTER the announcement of the government's investigation of monopolistic practices in the baking industry in Philadelphia, we received a caller who announced himself as the first public relations and publicity counselor for one of these companies. Presumably improved public relations are better late than never.

"Big Business" Just a Label

THE RECENTLY FORMED Farmers Co–Op., a consolidation (or holding company as it were) of a group of producer farmer co–ops, plans soon to release a large advertising campaign to market farm produce. This organization represents producers of approximately one-third of the marketable produce. There is little question that this organization, through its ability to advertise on a large scale and through other advantages, will be able to insure a satisfactory and profitable market for the products of its members. Surely it is big business to handle a sales volume which makes pikers out of many organizations usually referred to as "big business." Such a combine under other circumstances might merit the scrutiny of Washington bureaus. However, this organization has Washington's blessing. "Big business," "monopoly" and others are but relative terms.

Mickey Mouse Technic Used For Selling Annual Report

GENERAL MILLS this year pioneered still further in the field of building stockholders' good will by improving on last year's plan of taking annual meetings to stockholders. This year, annual meetings will be held in eight cities where stockholders will get a liberal dose of figures from the annual statement presented as entertainment. The medium employed is the animated-cartoon movie.

The show, which lasts 25 minutes, symbolizes the items in the financial statement with sacks of flour. Uncle Sam, as a collector, gathers his share of the income. "Depreciation," a rolly-poly unkempt sack, constantly requires nourishment, sapping available funds. Employees are shown receiving their share of the total as wages.

The picture sells the stockholders on the management as "Boss Flour Sack," who with his crew labors to retain a share of the total income as net profits to be distributed in part to stockholders. It also sells them on the importance as stockholders of buying company products which help to put dividends in their own pockets. Good public relations.

One of the cartoons used by General Mills in its animated-cartoon movie to sell its annual report to stockholders.

Two-way Payloads Cut Costs, Improve Quality

Long-haul private food trucks take one product out and bring another back. Shipping expense is no greater than by rail, and perishables reach market sooner, in better condition, and bring a premium price

THE average American motorist would be surprised to learn of the wide variety of food products carried direct from growing source to market in the large tractor-trailer units passed on our highways today. On our main-line highways, this stream of traffic is increasing, year by year, day and night, in both directions, because of the speed and directness of such motorized haulage. Two of the latest of such specialized food marketing operations are described and illustrated on these two pages.

One of the operations is conducted by A. Shrier & Sons, Inc., receivers and distributors of fruits and vegetables in the Detroit, Mich., area. The other is carried out by J. H. Miles & Co., which distributes fresh oysters from Norfolk, Va., to points as far north as Boston, Mass., and as far southwest as Little Rock, Ark.

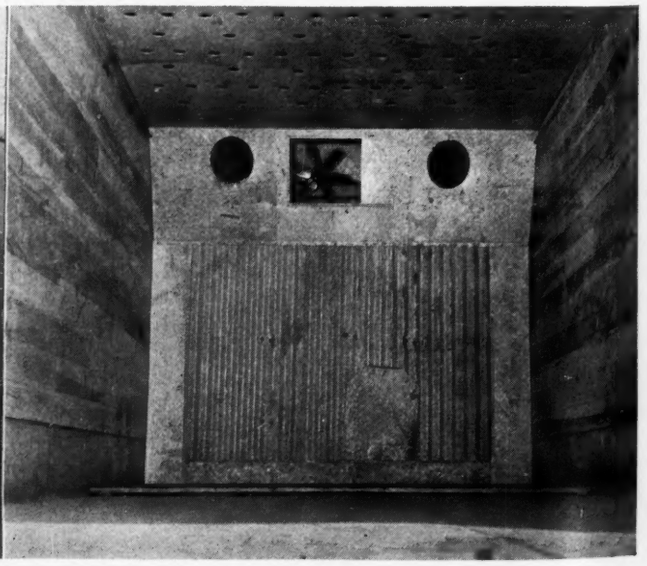
The Shrier company specializes in fresh strawberries, which it hauls from Hammond, La., a distance of 1,159 miles from Detroit. Beans are also hauled from Pompano, Fla., a run of 1,390 miles, and grapefruit from Edinburg, Tex., a haul of 1,820 miles.

By hauling loads in both directions, the cost of the inbound shipments is no greater than by rail, and the duration of the motor hauls are from 12 to 24 hours less than the best railroad time. This is the most important advantage of the motor haul in handling perishable produce.

In the case of strawberries, the berries are loaded in the trailers more fully ripened and are therefore in prime condition upon arrival at their destination and more attractive to the trade. They always bring top prices and usually sell at a premium. As compared with full rail carloads, the smaller trailer loads, which are from 9 to 15 tons, are more readily disposed of.

Although the crates may be stacked seven high in the trailer body, the "toppers" are just as good as the berries in the bottom crates. Another advantage of the motor haul is the fact that the shipments are under the control of the Shrier company from beginning to end.

The outbound loads from Detroit to the



At the left, a close-up of one of the A. Shrier & Sons overland produce haulers, showing the driver standing on a special platform built on top of the Ford tractor to start one of the two small gas engines which drive fans to circulate cool air throughout the trailer load while in transit. A temperature of between 34 and 38 deg. F. is maintained. Water ice is used as a refrigerant and 1,000 lb. can be carried in a compartment inside the front of the trailer and loaded through the hatch shown open in the trailer nose. The tractors and trailers are painted aluminum with black wheels. The interior of the trailer body is shown at the right. At the extreme front is the ice compartment, with the booster fan near the top. The fan circulates cool air downward through the load from the openings in the ceiling compartment.

Miles' Famous
OYSTERS
"Chesapeake Bay's Answer to the Nation's Appetite"
COAST-FRESH FROM THE FAMOUS MILES FARMS
J. H. MILES & Co. Inc.
Norfolk, Virginia

Oysters, fresh out of the beds of J. H. Miles & Co., Inc., in Chesapeake Bay at Norfolk, Va., are hauled at better than rail express speed by the two tractor-trailer units shown above to points as far north as Boston, Mass., and as far southwest as Little Rock, Ark. Both trailers are Fruehaufs. The front tractor is an International and the rear one a Chevrolet. Both tractors and trailers are painted white and trimmed in blue. The oysters are carried shucked in cans kept sufficiently cool in transit by being covered to a depth of several feet in snow ice, made in the company's own combination crusher and blower.

points of pickup which make the operation a two-way haul, and assure its success from a standpoint of cost, consist of such Michigan-grown foods as potatoes, onions, apples and Canadian rutabagas. These loads are purchased in Detroit and throughout Michigan and bring a ready market in southern points where such products are not raised.

Because the loads carried in both directions are owned by the Shrier company prior to delivery at each end of the runs, the company does not have to operate as a common carrier under ICC regulations except as to safety equipment and the drivers' hours of continuous driving.

Like the produce runs of the Shrier company, the oyster hauls of J. H. Miles & Co. out of Norfolk, Va., were predicated upon a shorter time in transit and some return loads. The latter provide back-haul revenue or its equivalent to assure an outbound unit cost no higher than the rail rate to the same point. The Miles company began its motor hauls in September, 1939, with two tractor-trailer units. One of the combinations makes two trips weekly from Norfolk, Va., to Boston, Mass., a distance one way of 550 miles. The other unit makes one trip weekly to Little Rock, Ark., a run of about 1,000 miles. On the latter route customers are also served in Nashville and Memphis, Tenn.

Today about 50 percent of the Miles company's oysters is shipped by rail in carload lots. These shipments go to all parts of the United States and to Canada. About 20 percent is hauled by trucks of customers which go to the Miles plant to load.

The balance of 30 percent of the company's total volume is about equally divided between express rail shipments and those hauled by the company's own two tractor-trailer units. In other words, the company hauls about 15 percent of its volume in its own motorized equipment.

The two principal routes mentioned previously were begun as an experiment and have proved satisfactory in every respect. The company-owned units have made deliveries just as fast as by express and just as cheap as by rail in car lots.

However, a greater extension of motor routes, with shipments formerly sent by express, would have been made, but on some runs the trailer's full payload capacity could not be carried across one or more States en route because of State laws. These laws limit the loads carried to less than the full 15-ton maximum payload capacity. On such runs, the trailers had to have their loads limited to the minimum allowable capacity of that State with the lowest payload or gross-load restrictions.

These less-than-capacity loads reduced the earning power of the motor units and increased the unit cost of the haul so that the runs had to be selected to pass through states permitting payloads of from 10 to 15 tons. Kentucky was particularly troublesome in this respect, and also Tennessee to some extent.

When full 15-ton pay loads can be carried, the motor routes can be made very profitable, because oysters carry a relatively high rate. Hence it is important to so route the vehicles that they pass through those States with the highest allowable payload or gross-load weights.

While return loads are not always available, the trailer on the Boston run often back-loads New England shell oysters, which are larger than the Chesapeake Bay varieties and for which the Miles company has some demand. On occasion, the Little Rock, Ark., trailer stops in Tennessee and loads coal, of which a great deal is used in the Miles plant and on which a great saving is effected.

The oysters are carried shucked in cans on which the lids are crimped but not sealed. No form of mechanical refrigeration is employed, since dry refrigeration is not good for a fresh seafood product. Instead, "snow ice," made in the company's own Link-Belt combination crusher and blower, is loaded on top of the cans to a depth of several feet. Except when the weather was most unseasonably warm, it has never been necessary to re-ice the load in transit.

Unlike the lack of need for mechanical refrigeration in handling oysters, the handling of fresh produce does require some sort of positive mechanical refrigeration. This the Shrier company has developed in the form of a so-called air conditioning system in which water ice is used as a refrigerant.

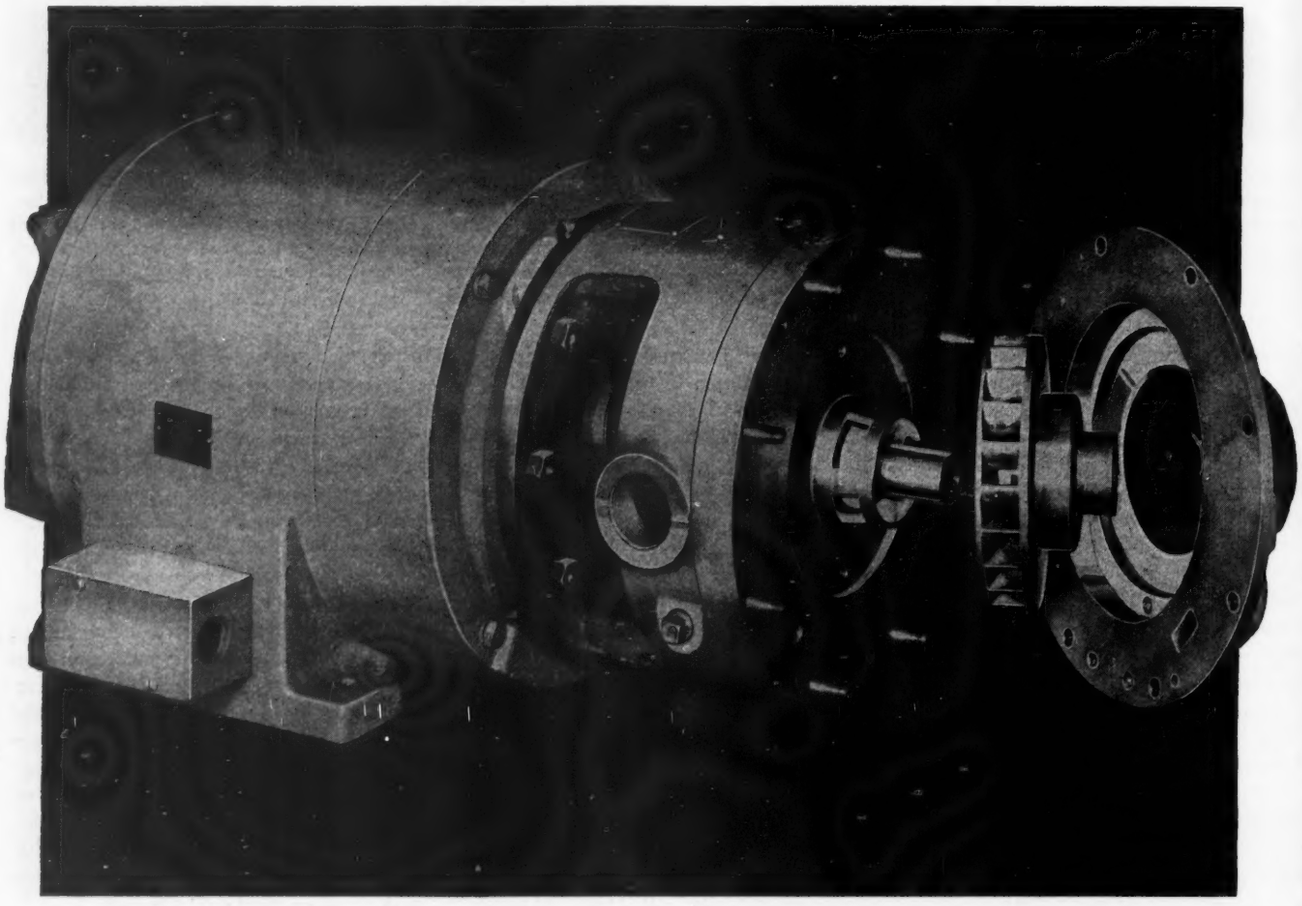
A thousand pounds of water ice is carried in a compartment inside the trailer body at the front. Two small, independently operated gasoline engines, mounted on a platform on the outside of the trailer body at the front near the top, drive two fans which circulate the air around the ice compartment to cool it and then pass it through the body.

By this means, the temperature inside the body is kept at between 34 and 38 deg. F. Water ice is universally obtainable along most any route when re-icing is necessary.

THE NASH CLEAN-AIR COMPRESSOR

REG. U. S. PAT. OFF.

has but one simple moving part.



The Nash Clean-Air Compressor has but one moving part, cast in one piece and rotating in the pump casing without metallic contact. No internal lubrication is necessary; therefore air or other gas compressed with a Nash is entirely free from oil contamination.

Dust and heat are removed from the air, or gas compressed, by the unique Nash "Liquid Piston". Air from a Nash Compressor is therefore delivered free from dust, heat, or oil, without supplementary filters or air washers, in a perfected mechanical structure with no internal wearing parts.

Air or gas from a Nash Compressor may be used for agitating, blending, maintaining pressure on storage tanks, or moving liquids and materials by pressure displacement, in connection with the most delicate food, beverage, or chemical process, without danger of contamination.

Bulletin D-252 tells all about Nash Clean-Air Compressors, and it is free on request.

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The Food Industry News

GENERAL NEWS, BUSINESS TRENDS, MEN, JOBS AND COMPANIES • FEBRUARY, 1941

Bigger Pack and More Sales Predicted for Canners in 1941

Speakers at convention see bigger year ahead. Other speakers report new discoveries. NCA to survey grade labeling

WHAT the defense program means to the food industry in general and the canning industry in particular was the theme of the convention of National Canners Association, held at Chicago, January 19–24. But preparedness had no monopoly on the meeting, for the canners paid important attention to grade labeling, processing problems, packaging and the outlook for 1941. They also spent much time at the machinery and supplies exhibit, the biggest ever held.

The basic procurement policies that will be followed by the Army in obtaining foods were outlined by Douglas C. McKeachie. Briefly, the procurement policies are:

1. Continuance of competitive bidding as the basic procurement policy.
2. Eligibility of any responsible vendor to submit bids.
3. Purchase of supplies, so far as possible, in carload lots, f.o.b. destination point. This may well serve to equalize Army business among suppliers in all parts of the country.
4. Inspection of all goods at point of origin. Such a system should avoid the difficulties of delays, returns and unnecessary claims.

Lieut. Col. Paul P. Logan, chairman of the food committee of the commodities division of the Army and Navy Munitions Board, explained the workings of the Army's new procurement system. (This system was reported in FOOD INDUSTRIES for January, page 66.)

The outlook for 1941 was discussed by Dr. Neil Carothers. Because of the demands of the defense program and the possibility of having to feed starving people abroad, "there should be a proper and reasonable increase in this year's pack," he said. "But the conditions do not warrant reckless expansion of production."

A larger yield of both fruits and vegetables this year was predicted on the basis of Department of Agriculture statistics by Col. Philip B. Fleming, wage-hour administrator. And not only will there be bigger crops to can but there will be more money in the pockets of the average consumer to take them off the market, he said.

ROBERT C. PAULUS
Elected president of Canners Association

Dr. Samuel C. Prescott, Massachusetts Institute of Technology, pointed out that canned foods are especially suitable for feeding the armed forces. They are high in sanitary quality, are easily transportable, easily stored and quickly prepared, he said.

Some enlightening technical papers were presented at the convention. D. J. Wessel and H. A. Benjamin, research department, American Can Co., Maywood, Ill., discussed "Process Control of Heat Resistant Spoilage Organisms in Tomato Juice." A limited study of agitating processes indicates that high speed rotation, by increasing the rate of heat penetration into the can, holds considerable promise of permitting more lethal processes without serious impairment of quality, they said. Studies of "flash" processing of tomato juice in a tubular heat exchanger indicated that it could be employed commercially with success.

Important causes of "springers" in canned meats were listed by G. V. Hallman, Continental Can Co., Chicago, as follows:

1. Overfilling of the can.
2. Low closing temperature of product when can is exhausted by heat.
3. Insufficient vacuum when this is obtained by mechanical means.
4. Delay between closure and processing of cans.
5. Incipient spoilage of products.
6. Leakage of can.
7. Excessive distortion of can ends during processing.
8. Rough handling and denting of can.
9. Changes in altitude and temperature of storage.
10. Type of ends.
11. Chemical reaction between ingredients of the product.
12. Chemical reaction between product and can.

Calcium, added to shrimp during canning, prolongs the shelf life of the shrimp by keeping it firm longer and also improves the color of the product, it was reported by C. H. Bloedorn, research department, Continental Can Co., Chicago. Permission to use the treatment has been granted by the government, with stipulations as to calcium percentage and certain label requirements.

Discussing the effect of process and filling temperature on the quality of tomato juice, C. M. Merrill, research laboratory, National Canners Association, said that it would appear unwise to risk spoilage losses by using low filling temperatures or low processes when it is indicated that these factors do not have an appreciable effect in bettering the general quality of tomato juice.

A significant move was made by the NCA in respect to grade labeling. The directors authorized a nation-wide survey to determine whether consumers prefer grade labeling or "informative labeling".

NCA elected Robert C. Paulus, Paulus Bros. Packing Co., Salem, Ore., president. Carroll E. Lindsey, Lakeland Heights Canning Co., Highland City, Fla., was named first vice-president; Alfred W. Eames, California Packing Corp., San Francisco, second vice-president (reelected); and Frank E. Gorrell, Washington, secretary-treasurer (reelected).

Department of Justice Gets Indictment Against Bakeries

Arnold charges eleven leading firms with violating Sherman law in drive against food price rises

ELEVEN of the largest baking companies serving Delaware, New Jersey and Pennsylvania were indicted on January 9 by a Philadelphia Grand Jury, charged with violation of the Sherman Antitrust Law. Thirty-three executives of the companies involved were required to post bonds totaling $219,000.

The indictment was the opening attack in the drive launched in November by Assistant Attorney General Thurman Arnold against food industries to prevent unwarranted increase in prices.

The charges claim an illegal combination of the baking companies to regulate the price, size and weight of loaves of bread sold. The government also charged conspiracy to prevent the sale of "day-old" bread and to destroy independent bakers by price cutting.

The eleven companies named in the indictment are Friehofer Baking Co. and William Friehofer Baking Co., both of Philadelphia; Parkway Baking Co. of Philadelphia, Continental Baking Co., General Baking Co. and Ward Baking Co., all of New York; Fischer Baking Co. and Dugan Brothers of New Jersey, Inc., both of Newark, N. J.; Hazelton Bakeries, Inc., of Binghamton, N. Y.; Huber Baking Co. of Wilmington, Del.; and Capital Bakers, Inc., of Harrisburg, Pa. Arraignment of companies and officials indicted is not expected before June.

The bakers are charged with setting up three organizations, the Philadelphia Bakers Club, the Philadelphia Bakers Council, and the Interstate Bakers Council with George Gotwols as secretary, to hold meetings where representatives conferred regarding trade conditions and practices. It is alleged that the 11 companies increased the price of bread one cent a loaf on March 5, 1940, and that shortly after commencement of the government antitrust investigation in July the price of bread dropped one cent in Philadelphia, in a considerable part of Pennsylvania and in all of south New Jersey.

A second indictment specifically charges the two Friehofer companies with conducting price wars in Philadelphia, Atlantic City and Wilmington against competing baking companies. So called "mystery loaves," larger in size or lower in price, are attributed to the William Friehofer Co. for the purpose of driving "bobtailers" and independent bakers out of business.

The defendants of both indictments, formally charged as "continuously engaged in wrongful or unlawful combination and conspiracy in restraint of interstate trade in violation of the Sherman Antitrust Act," have as yet had no opportunity to reply to the charges.

Shrimp Regulations Amended

THREE MINOR CHANGES have been made in the canned shrimp inspection regulations of the Food and Drug Administration. These involve the data by which application for an initial inspection period may be filed (not later than June 1 unless good cause is shown), the amount of the advance deposit, and the export regulations. The wording has also been so modified as to bring the regulations into harmony with their present status under Federal Security Agency.

Dairies Net 9.7 Percent

TWELVE LEADING CONCERNS in the milk and milk products industry in 1939 realized 9.7 percent of the stockholders' investment as net income on their average corporate net worth investments.

According to the Federal Trade Commission, the 9.7 percent figure, representing combination of foreign and domestic sales, was reached after deduction for income taxes, minority interest in profits, and overhead.

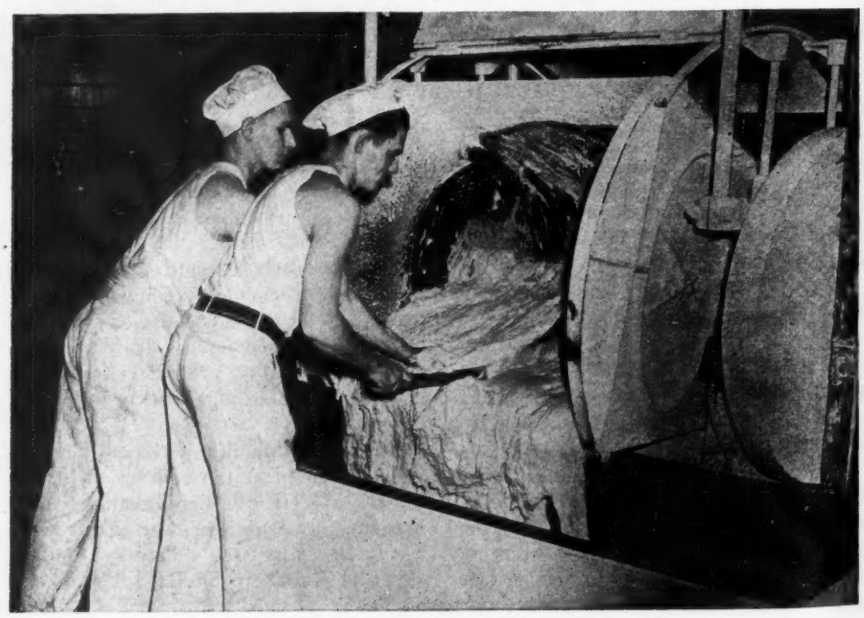
Sales by the twelve milk corporations in 1939 amounted to $806,887,761, of which $770,455,562, or 95.5 percent, represented domestic sales and $36,432,199, or 4.5 percent, represented foreign.

A&P Extends Grade Labeling

THE Great Atlantic and Pacific Tea Co. has extended its alphabetical grade labeling practice to include its complete line of canned fruits and vegetables. The decision affects 120 of the chain's canned food labels. An informative panel explaining the different standards of A, B, and C quality foods will be placed on every product for which the Department of Agriculture has standards.

Tin Reserves Increasing

ACTUAL consumption of primary tin in the United States in 1940 was about 74,000 tons, *Engineering and Mining Journal* will say in its February issue, while deliveries of primary tin amounted to 115,497 tons. According to that publication, consumption of the primary metal, exclusive of any secondary or recovered tin, will be between 75,000 and 80,000 tons in 1941. It is estimated that the government now owns about 40,000 tons of tin, which is about half of the reserves that are planned.



BUSINESS THE BAKERS WON'T GET

There's dough in the Army, but commercial bakers won't get as much of it as they had hoped, for the Army is baking bread for itself. Here is the evidence. Trainees at Ft. Lewis, Wash., are taking instruction in the art of making bread. They are among a number of soldiers of the camp who have enrolled in a cooking course which will make up for the shortage of cooks at the base, where over 75,000 troops will be stationed by the end of this year.

Budgets Funds for U. S. Food Agencies

President seeks appropriations that will allow departments to continue activities

THE PRESIDENT'S budget for the fiscal year beginning next July 1 is not nearly so economical as earlier utterances had indicated it would be, insofar as agencies whose work is of interest to food processing industries is concerned. Few, if any, of the food regulatory agencies are recommended for curtailment of funds or activities, and the farm program is given money for continuance practically at its present level.

The biggest item of interest to the food trade is that for Army subsistence. Next year's budget carries $221,697,000 for feeding the Army, compared to $147,367,238 provided in the current year and $35,000,000 in the last year of the normal peacetime force. This appropriation further entrenches the Army's position as the nation's largest individual food buyer.

Federal "police" agencies are dealt with leniently in the budget recommendations, most of them getting requests for increased funds. The antitrust division of the Justice Department, for instance, is put down for nearly a 20 percent increase, from $1,323,800 to $1,575,000. These additional funds, if voted by Congress, will permit considerable stepping up of the division's nation-wide investigation of the food industry, recently launched with considerable fanfare.

The Federal Trade Commission is listed for a $60,000 increase, all to hire additional help, giving it a total appropriation of $2,360,000. The Wage-hour division likewise gets a small increase, from $5,730,800 to $5,733,310, and NLRB's budget is upped by $51,740, to $2,952,740, with a further juggling of its own funds to provide $126,000 new money for salaries.

Contrary to this trend, the Food and Drug Administration budget request by the President is $125,000 lower than for the current year, down to $2,203,000.

The farm and surplus crop aid program carries $200,000,000 for disposal of surplus commodities, a decrease of about $35,000,000 from current year's allotment. If this request stands through Congress, the food stamp program will inevitably be "frozen" when it reaches the level of approximately $10,000,000 turnover a month—expected about next April. Even at this level, blue stamps will force some curtailment in the other surplus disposal program—school lunch, direct distribution and low-cost milk—and would certainly halt further expansion of the "infant" cotton stamp plan.

The Department's four regional laboratories are continued in the 1942 budget as a $4,000,000 operation, an allotment unchanged from this year.

HEADS DAIRY DIVISION

O. M. Reed, who has been appointed chief of the dairy division of Surplus Marketing Administration. He had served as acting chief of the division since February, 1939, and has been with the Department of Agriculture since November, 1933, when he joined the staff of the dairy section of AAA.

Discovers Way To Get Sucrose From Sorghum

FOR MANY YEARS sugar chemists have wanted to develop sorghum cane juice for sugar manufacture. But crystallization of the sugar from the juice was extremely difficult. Much interest has been aroused, therefore, in the report by Dr. E. K. Ventre, of the Mississippi State Experimentation Station, that he has developed a process by which sugar could be recovered from these juices.

Dr. Ventre discovered that two substances had to be removed from the juice to permit crystallization. These were salts of organic acids and starches which had just stopped short of becoming sugars chemically.

These were removed in three steps. (1) The sorghum juice was mixed with lime and then heated to boiling, concentrating about 70 percent of the starch as a "scum" on top of the sirup. (2) A centrifuge was used to remove about 12 percent more. (3) The sirup was treated with enzymes, especially one obtained from malted barley. The sorghum sugar then crystallized readily.

Food is Country's Leading Industry

Bureau of Census puts worth of products for 1939 at more than ten billion dollars

THE FOOD INDUSTRY is the most valuable single industrial group in the county from the standpoint of value of its products, the Bureau of Census reports. The 1939 products value was placed by the bureau at $10,603,950,671, of which the largest individual unit is $2,649,292,810 worth of meat products.

The same report lists the food industry as second in wages paid and third in wage earners in the nation. Food industry wages of $913,981,553 paid in 1939 was topped only by the iron and steel industry, which paid out $1,313,633,202. In number of employes, the textile industry was first, with 1,075,702, followed by iron and steel, with 966,371, and foods, with 824,009.

Controversy Prolongs Hearing on Chocolate

EMULSIFYING AGENTS and various flavoring agents occupied the attention of the chocolate products hearing held in Washington January 6–9. The discussion was prolonged by controversy over relative merits of different types of emulsifying agent.

The problem of sweetening agents was to be taken up on the resumption of the hearing on January 27. The announced intention of those interested in the sweetening agent problem was to read into the record those portions of the records of other hearings in which the sweetening problem was discussed. It is hoped by this technic that much repetition of basic testimony might be avoided. Anyone interested in introducing further evidence, of course, would be able to do so.

Brewers Associations Merge

TO CREATE a united front against factions opposed to the brewing industry and to avoid a duplication of efforts, two of the important brewers organizations have combined. The two groups are the United States Brewers Association and American Brewing Industry, Inc., and the new consolidated Association will function under the name of the former.

The executive staffs and the boards of directors of the two groups have been combined. C. D. Williams, former secretary of U. S. Brewers, is the general secretary of the new association, while Ralph Kettering, former secretary of American Brewing Industry, Inc., heads the Chicago office.

Seek Higher Duty On Jap Crab Meat

American packers say 50-percent higher tariff will increase domestic output ten-fold

AMERICAN crab meat canners urged the U.S. Tariff Commission in January to recommend Presidential increase in the duty on Japanese crab imports as a means of vastly stimulating production of the American product. One estimate made by Sterling G. Harris, chairman of the American Crab Packers Committee, is that a 50 percent increase in the Japanese duty would make possible ten-fold increase in American output.

An important delegation of Congress backed the committee's plea with written statements filed at Tariff Commission hearings. But opposition to increased tariffs was voiced by American importers, whose spokesman was C. T. Riotte. He contended that Japanese crab meat has a distinctive flavor and should not be regarded as competitive to the American product, an argument which was disputed by Hugh Frampton, attorney for the American producers.

The Commission's recommendation is not expected to be ready for the President until late in February or March. The President, under the law, may increase existing duties by 50 percent on the declared import value or transfer the present duty to the retail price.

Meanwhile, the first journey of the Fish and Wildlife Service's crab meat-canning expedition to Alaskan waters has ended successfully, according to the Service. A second trip will be made beginning late this month. Detailed results of the first trip are being analyzed but have not been made public. The purpose of the two journeys is to determine the economic practicability of private commercial American crab meat canning with the giant King crab of the Northern Pacific waters.

Courts Asked To Change Standards for Preserves

DURING JANUARY papers were filed in the case being brought in the Circuit Court of Appeals in New York City against the Food and Drug Administration in the matter of the preserve standards. In this case the beet sugar association, the cane sugar association and three large sugar refiners join as appellants. This group asks that the Administrator be compelled to require declaration of dextrose on preserve and jelly labels.

The new case apparently parallels and opposes directly the one in which the Corn Industries Research Foundation is appellant in Chicago asking that the same standards be broadened to permit use of corn sirup, as well as sucrose and dextrose, without label declaration.

It is the impression in Washington that neither of these cases will be aggressively prosecuted until after the industries know what decision Mr. McNutt and his staff will reach in the canned fruit proceedings for which the supplemental sugar hearing was held in September, but for which even tentative findings have not yet been published. The guess is that these tentative findings will not come out very soon, perhaps not until mid-March.

FDA Makes Quick Work Of Two Food Hearings

Holds brief sessions on canned fruits and fruit cocktails

THE canned fruit cocktail hearing convened on January 13. Before lunch on the 14th the hearing adjourned with all interested parties satisfied by then that sufficient factual evidence was in the record so that a satisfactory standard might be established.

The hearing was requested by the Canners League of California. H. Thomas Austern was legal counsel for the Canners League and Ralph E. Sanborn, general superintendent of California Packing Corp., was the principal technical witness. A number of other manufacturers' representatives testified at the hearing.

Largely responsible for the short hearing was the agreement by all interested parties that the record of the hearing include testimony on sweetening agents from earlier hearings. Those old records to be copied into the new are as follows:

1. Part of the fruit record and all of the "sugar" record in canned fruit docket No. 5 (April and May, 1939).
2. All of the record in canned fruit docket No. 23 (September, 1940).
3. Part of the record in fruit preserves docket No. 10 (September, 1939).

Briefs in this fruit cocktail docket must be submitted by February 8.

The hearing on the requested amendment of the standards of quality for canned peaches, canned apricots and canned pears was even shorter than that on canned fruit cocktail. Representatives of the Canners League of California, proponents of this amendment, were the only interested parties present other than representatives of the Food and Drug Administration. However, the Yakima Fruit Growers Association had sent a telegram stating their interest in the hearing and requesting a postponement.

Since the proponents of the amendment preferred to wait until a representative of the Yakima Association was present, the presiding officer agreed to an adjournment until February 17.

In late January it was not expected in Washington that the findings of fact and tentative order on the canned fruit standard, for which a hearing was held last September, would be promulgated until the complete records are available from these two new dockets. This would mean that March would be the earliest date by which any tentative sweetener decision might be issued.

"Our new shipping clerk has a system all his own."

Nazis Find Tinless Can Suitable Only for Meat

TINLESS cans apparently have not worked out too well in Germany. Reports to the U.S. Department of Commerce indicate that German packers are planning to curtail their use to a large extent. And an arrangement has been reached under which these cans will be employed only for meat products. Experiments with containers made with phosphated and japanned black sheet have indicated that these are suitable only for alkaline-reacting foods, their usefulness for fruits and vegetables being limited.

SCHEDULE OF EVENTS

FEBRUARY

3–15—Twentieth Annual Canners' and Frozen Food Packers' School, Horticultural Products Building, Oregon State College, Corvallis, Ore.
15–22—Annual Cherry Week.
18–20—Technical School for Pickle and Kraut Packers, Michigan State College, East Lansing, Mich.
28—March 7—Canned Salmon Week.

MARCH

6– 8—National Dairy Council, winter conference, Hotel John Marshall, Richmond, Va.
10–13—American Society of Bakery Engineers, Edgewater Beach Hotel, Chicago.
17—Ten-week Technical course of Seibel Institute of Technology will open, Chicago.

Answers to Food Law Questions

Interpretative Opinions from F&DA Letters to the Industry

AS EXPECTED, the heavy volume of trade correspondence which the Food and Drug Administration has carried on has now tapered off. The following five abstracts summarize the correspondence of interest to food manufacturers since the last printing in FOOD INDUSTRIES, December, 1940, page 91.

ABSTRACTS

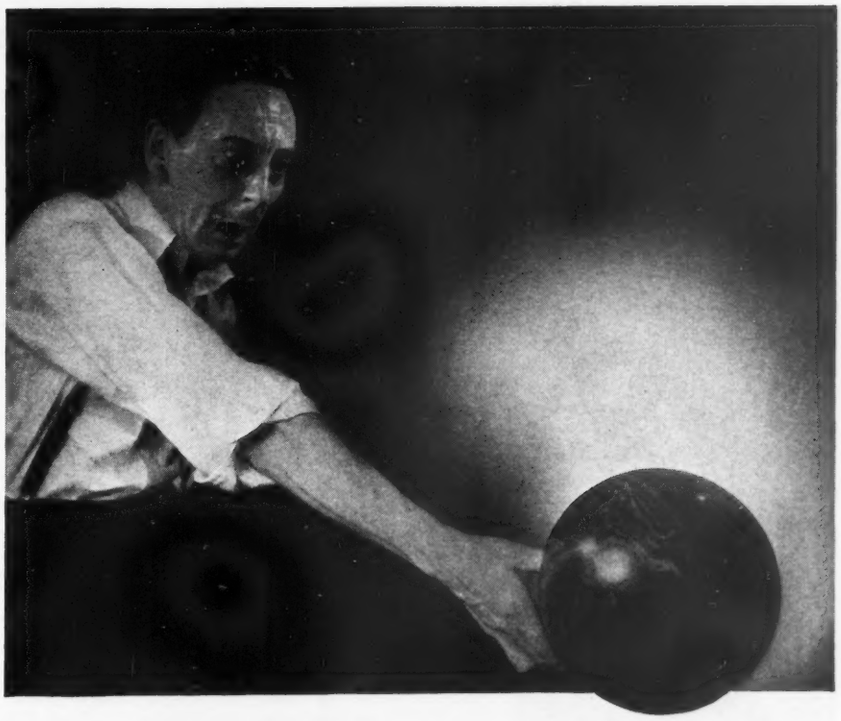
219. (Rescinds 121). *Marmalades* are not included among definitions and standards for preserves and jellies effective December 4, 1940; therefore, ingredients should be labeled.

220. The term "starch," unqualified, in an ingredient statement, indicates *cornstarch* to the average purchaser; if other starch is used, it would be desirable to indicate type.

221. The variety of *artichoke* should be declared by its common or usual name, if any, in a listing of ingredients of a food product.

222. The ingredients of canned *applesauce* must be declared on the label.

223. In label designation of various types of *cream*, only those names may be used which are specifically set forth for each type of cream in the standards of identity recently promulgated.



...but his thumb got stuck in the ball!

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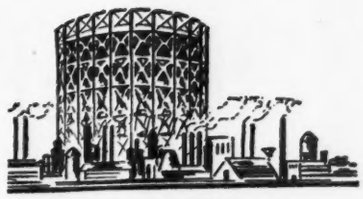
And now . . . all made futile by a detail . . . the size of a hole in the ball!

No doubt Charlie burned with chagrin, but *he* got another chance. For America, there will be no other chance. Collectively, American industry must produce needed armament . . . or else.

And armaments include more than guns and trucks and planes, for *food* plays second fiddle to no item of defense, the girder-upper of the inner man, ultimate source of all the other sinews of war! Thus, if heating processes . . . roasting, toasting, high-temperature cooking, drying, can-making, . . . are the thumbhole of *your* production ball, Kemp can help you get it rolling.

Kemp can give you faster heating, more accurate control and drastic reduction in fuel costs, *no matter what equipment you are now using!*



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Preservers Desire Higher Standards

Close quality control advocated at meeting. Improved glass jar developed for the Army

THE SHADOW of a boom in busines from the national defense program created more than usual interest in the discussion of industry problems at the convention of National Preservers Association in Chicago, January 19–23.

Royal Shawcross, A. A. Knights & Son Corp., Malden, Mass., president, advocated closer standards of quality and said much had been gained along this line through close cooperation of the association with the Department of Agriculture. He reported that a price reporting system as requested by members was found to be impractical and that the association had failed to obtain government standards for cold packed fruits. He warned that dangerous days ahead may result in inevitable regulation of the industry. The most important work for 1941 is to cooperate closely with the food and drug act, he counseled.

More than five times as much money as appropriated in 1940 has been allocated by the association for laboratory work, B. R. Forbes, Washington legal adviser, announced, and will be used for locating new markets and testing samples of adulterated products.

Discussions brought out that very little is being done by the government to correct known variations from juice products labeled pure. However, indications point to an early disposition of FDA to crack down on violators of the FDA jelly standards.

The requirements of the army procurement officials for a glass package for preserves and jellies as requested by Lieut. Col. Paul P. Logan, chairman of the food committee, commodities division, Army and Navy Munitions Board, has been met in the creation of a 2-lb. jar of the following specifications, as explained by John S. Algeo, Hazel-Atlas Glass Co.: Height, 5 3/16 in.; opening 70 mm.; sloping shoulders; rounded bottom; label space 2 5/8 in. Weight is light. This construction, together with the specifications made for the shipping case, are designed for rough handling, as is the screw cap, with either a rubber or composition gasket. Specifications are being worked up for an export shipping case. The new jar also will appeal to consumers, it is believed.

A. N. Chappell, Bama Co., Birmingham, Ala., was elected the new president. Wm. E. Smucker, J. M. Smucker Co., Orrville, O., was made vice-president; and Wayne C. Meschter, American Preserve Co., Philadelphia, was elected secretary-treasurer.

CAPITAL VIEWS

HEINZ MUST SIGN—The Supreme Court has ruled that H. J. Heinz Co. must sign a written contract covering the employment agreement negotiated with its workers under the National Labor Relations Act. NLRB has pressed several other cases on the basis of this decision and is extending the scope of some of its findings, giving greater force to labor-union arugments than heretofore. The Court, so the Board feels, has greatly strengthened the requirements for compelling prompt negotiation and the reduction of agreements to writing in such cases.

MILK A UTILITY?—For some time many of the government economists have wanted to make more of a public utility out of the fluid milk business. Now the Department of Agriculture is definitely on record with recommendations of this sort, the proposals having the avowed objective of "reducing the costs of food distribution" by reducing the number of marketing agencies with closer control of the resulting monopolistic units. In effect, the recommendations would put milk and milk products under regulatory control comparable with the present State and Federal systems for the management of gas, electric light and other natural monopoly units of the utility industries.

CONGRESS STARTS — As Congress opened it was confronted with several major problems which will far overshadow all other legislative matters for some time, probably until nearly spring. The new defense policy being formulated, a program for increased taxation, the handling of the public debt question, war measures for labor control and strike prevention—these are but a few of the topics that will take the bulk of the time of the legislators for weeks to come. Despite this, some legislation of particular concern to the food industries may be expected to move forward quietly. But controversial issues are not likely to go very far or very fast because Administration leaders do not want to divert the attention of either House to such questions until the big defense questions have been nearly or fully settled. And "by that time we shall be well into the war," much of Washington seems to think.

EXPORT CONTROLS–Restrictions on export of many types of minerals, metals and other industrial goods have been imposed. But no foods are yet (or are likely to be) so regulated. Far more likely is stimulated import of any food for which additional supplies may be needed for price control. (See this column of last month.)

INFLATION CURB—Every type of price except prices of agricultural products are to be curbed vigorously by action from Washington. The advance of raw material costs will not be taken as an excuse for rising retail prices of foods if the extremist group has its way. The fact that the resulting lower margin for manufacturing and merchandising might ruin many enterprises is not any excuse for tolerance, these folks think.

FEDERAL TRADE RULINGS — The Federal Trade Commission continues aggressively to rule on food advertising, packaging and labeling. Recently several such actions have been taken, including complaints against slack fill, charges of improper claims on labels as to the number of crackers in a package, and claims regarding vitamin efficiency of certain chocolate-milk products. Food manufacturers can expect any variation from permissible practices to be acted on by FTC quite as promptly as by the Food and Drug Administration. The authority of the two agencies overlaps here, which increases the diligence of both.

NEW CONTAINER COSTS—New minimum wage proposals are pending which are likely to set for many divisions of the paper products industries a minimum wage of 40 cents per hour, effective quite soon. If so, there will probably be higher labor costs in many of the container manufacturing industries, including those which make folding paper boxes, bottle caps and hoods, waxed paper, waterproof, glazed and fancy paper, and other specialties commonly used in packaging foodstuffs.

RESTRICT THE F&D LAW? — Some divisions of the food industry think that they can get Congress to exempt them from further application of the Food, Drug and Cosmetic Act. Some in the dairy industry, notably cheese men, are reported to be of this opinion. Impartial observers of Washington do not think that any food manufacturer, no matter how powerful his Washington lobby normally may be, would have a chance at putting through such a restriction on the Food and Drug Act.

Other divisions of the food industries very much hope that these dairy folks will not open up that question with Congress. They know that the resulting mud slinging would spatter everybody within range, regardless of whether he tried to keep out of the fight or not. These other divisions feel that their reputations might seriously suffer from the charge of being unwilling to protect the public health and safety, even though they themselves took no part in such a legislative effort, in fact, even if they opposed it.

Bars Benzoate of Soda As Catchup Ingredient

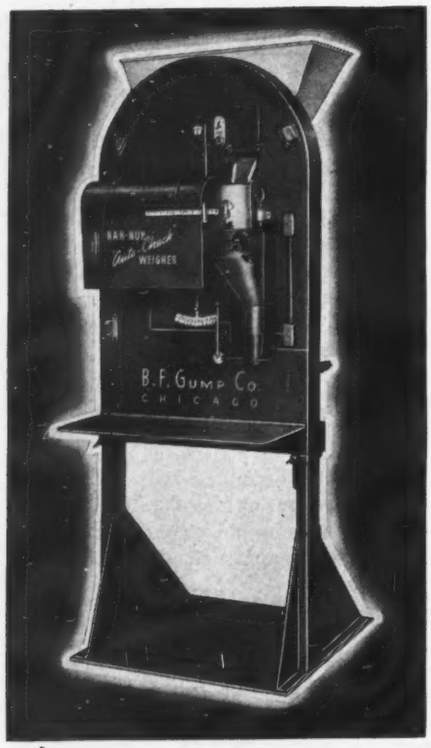
MANUFACTURERS of tomato catchup will not be permitted to put benzoate of soda into their product as a preservative under the Federal Food, Drug and Cosmetic Act. On January 11 the Federal Security Administrator issued an order denying an amendment to the standard of identity for tomato catchup which would have permitted this, the amendment having been proposed by the Canners League of California.

The Administrator based his decision on the conclusion that the use of benzoate of soda would promote production of catchup of less than usual concentration and acidity and would not promote honesty and fair dealing in the interest of the consumer. This conclusion was reached from testimony presented at a hearing last September.

ARMY PREPARES TO HANDLE PERISHABLES

More than 1,400 large mess hall ice refrigerators have been ordered from one company by the Army. Here are some of the units on the production line in the plant of Weber Showcase & Fixture Co., Inc., Los Angeles. Perhaps even more significant is the fact that the Army is constructing 46 modern cold storage units at various camps. Each will accommodate enough perishable food for 16,500 men for three days, and will maintain a freezing temperature of 10 deg. in the center compartment and 35 to 38 deg. in the surrounding space.

Save with a BAR-NUN "Auto-Check" WEIGHER



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Bar-Nun "Auto-Check" Weighers automatically weigh and check weigh pulverized fine ground and granular materials with uncanny accuracy.

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Food Standards Activity Increases with New Year

Several products are affected by FDA actions in January

FOOD STANDARDS ACTIONS were brisk during early January. The food standards committee of the Food and Drug Administration announced two open meetings for early February. On February 4 the open meeting will be to consider formulation of maturity and frost damage standards for oranges and grapefruit. On February 6 the open meeting will receive further suggestions and factual data on standardization of frozen desserts, supplementing the open meeting of November, 1939. (See FOOD INDUSTRIES, December, 1939, page 717.) These meetings, of course, do not take the place of formal hearings which will be announced for some future date.

The final orders have been issued in docket No. 11 covering Cheddar cheese, washed or soaked curd cheese, and Colby cheese. These orders were published in the *Federal Register* for January 9 and the standards are effective on April 9. A correction was published in the *Federal Register* about a week later, stating that finding of fact No. 14 correctly reads "Colby cheese contains not more than 40 percent of moisture."

Announcement of a new docket is still anticipated for the formulation of a process cheese standard. Late in October the Food and Drug Administration officials said that this would be taken up "as soon as opportunity presents."

Proposed amendments of some of the drug regulations of the Food, Drug, and Cosmetic Act have been announced. These were also published in the *Federal Register* of January 9, but have very little of interest to the food manufacturer.

Hearings on canned fruits, canned fruit cocktail, and chocolate products were held, these being reported more fully elsewhere in these pages. An amendment to the tomato catchup standards was denied—also reported elsewhere in this department.

Pickles To Be Promoted On Basis of Food Value

Nutritive qualities discovered. Pickle business looks up

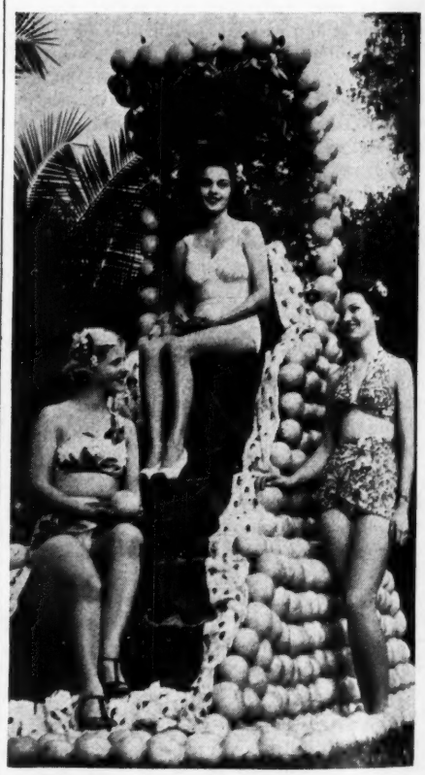
ENCOURAGING signs heartened pickle packers attending the convention of National Pickle Packers Association in Chicago on January 22. Recent research has revealed high nutritive value in pickles, consumer demand has increased and salt stock carryover is the lightest in years.

The fact that pickles are high in nutritive value (especially bread and butter, sweet and genuine dill pickles) was discovered by studies at Michigan State College. This work so far has covered six different types of market pickles. The research program was initiated in June, 1939, doubled in June last year and is now supported by two-thirds of the packers in the Association.

On the basis of the data on the food value of pickles, the newly elected officers of the Association were authorized to formulate a promotion program to be presented at the regular June meeting.

As for the carryover, 35 members reported 2,374,440 bu. as of January 1, and the figure for the entire industry is placed at 4,809,000 bu. The average monthly consumption was up to 418,000 bu. from October 1 to January 1, as compared with 400,000 bu. for previous months. Reports on acreage contracted for 1941 show an increase of approximately 20 percent over 1940 plantings, with contract prices remaining about the same as last year, except in some instances where conditions are unusual.

F. Olney Brown, Squire Dingee Co., Chicago, was elected president of the Association; Lewis Sherman, Holsum Products Co., Milwaukee, vice-president; C. J. Sutphen, C. J. Sutphen & Co., Chicago, treasurer (reelected).



CITRUS QUEEN PICKED

Perched upon the grapefruit throne is Sally Parshall, Orlando, Fla., schoolgirl selected as "Miss Florida Citrus" by the Florida Junior Chamber of Commerce. Her selection marked the opening of the annual citrus drive staged recently by the Junior Chamber of Commerce.

INDICATORS

KRAUT PRODUCTION in 1940, final figures, according to the National Kraut Packers Association, was 375,457 casks of 45 gal. each, compared to 333,798 casks in 1939.

SPINACH ACREAGE for canning in prospect for 1941 is up 26 percent above 1940 plantings, according to National Canners Association.

CANNED PUMPKIN and squash output in 1940 totaled 2,298,378 cases, compared to 2,292,134 cases in 1939, according to National Canners Association.

FLOUR OUTPUT in December, 1940, as reported by *The Northwestern Miller* for mills producing 64 percent of the flour manufactured in the United States, was 5,380,593 bbl., compared to 5,234,571 bbl. a year before. The same mills produced a total of 66,334,763 bbl. in 1940, compared to 67,221,061 bbl. in 1939, according to the same publication.

FISHERY PRODUCTS, frozen, in storage on December 15, 1940, totaled 98,338,000 lb., compared to 97,531,000 lb. one month before and 6 percent above the 92,431,000 lb. in storage a year previous.

CANNED SEAFOODS exports by Japan in the six-month period ending June 30, 1940, were 28 percent below those of the corresponding period of 1939.

COCOA BEAN imports into the United States in 1940 of approximately 5,000,000 bags were at an all-time high and as the supply in storage did not increase much, indications are that cocoa consumption also made a new high record.

CATTLE ON FEED for market in the Corn Belt States on January 1, 1941, were 11 percent more numerous than one year before. In the 13 Western States, the increase was 10 percent.

PORK PRODUCTION in December, 1940, was the largest on record for the month and 13 percent over production in December a year before. This was the third consecutive month to break previous records.

OLIVE OIL PRODUCTION in California this season is expected to be 1,000,000 gal. at a maximum, only about 12 percent of normal U. S. requirements.

PROCESSED MILK EXPORTS to Great Britain, January to October, 1940, inclusive, were around 70,000,000 lb., compared to less than 300,000 lb. in the like period of 1939.

FLUID MILK SALES in November, 1940, were 3.11 percent above sales in November, 1939, according to the Milk Industry Foundation.

BUTTER, creamery, produced in November, 1940, was 115,720,000 lb., 4 percent above November, 1939, and 6 percent above the 1930–1938 average for the month.

BUTTER, creamery, produced in the first eleven months of 1940 was 1,683,510,000 lb., up 2.4 percent above 1939 production for the same months and 7.7 percent over the 1930–1938 average for the period.

CHEESE, American, produced in November, 1940, was 35,520,000 lb., an increase of 13 percent over production in November, 1939, and 36.9 percent over the 1930–1938 average for the month.

CHEESE, American, produced in the first eleven months of 1940 totaled 555,580,000 lb., an increase of 10.5 percent over production in the like period of 1939, and 33 percent above average production in 1930–1938 for the period.

OLEOMARGARINE SALES for the first eleven months of 1940 totaled 289,742,080 lb., as indicated by sales of internal revenue stamps. This was an increase of 6 percent over sales for a like period of the preceding year.

FIG PRODUCTION in California in 1940 was 22,948 tons, compared to 21,611 tons in the preceding season.

FRUITS, frozen, in storage on January 1, 1941, totaled 142,405,000 lb., compared to 128,337,000 lb. a year before and to an average in 1936–1940 of 106,106,000 lb. for the date.

VEGETABLES, frozen, in storage on January 1 totaled 78,320,000 lb. compared to 72,427,000 lb. a year before.

BUTTER, creamery, in storage on January 1 of this year was 41,590,000 lb., compared to 55,462,000 lb. a year before and to a 1936–1940 average of 65,707,000 lb. for the date.

CHEESE, all kinds, in storage on January 1, 1941, was 128,413,000 lb., compared to 108,241,000 lb. on January 1, 1940, and to an average in 1936–1940 of 108,463,000 lb. for the date.

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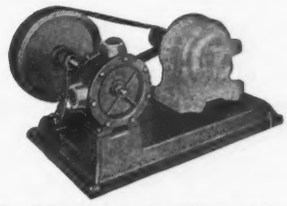

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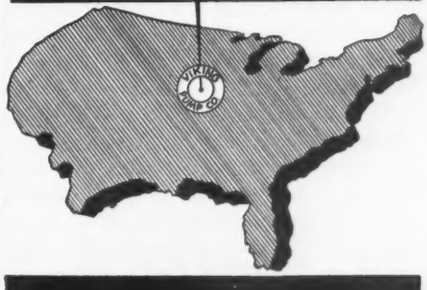

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PUMP COMPANY

CEDAR FALLS, IOWA

EGGS, case equivalent, in storage on January 1, 1941, totaled 2,697,000 cases, compared to 2,597,000 cases a year before and to an average for January 1 in 1936–1940 of 2,746,000 cases.

POULTRY, all kinds, in frozen storage on January 1 of this year amounted to 208,234,000 lb., compared to 167,643,000 lb. on January 1, 1940, and to an average in 1936–1940 of 145,105,000 lb. for the date.

MEAT, all kinds, in cure and frozen storage on January 1, 1941, was 868,436,000 lb., compared to 645,969,000 lb. a year before, and to an average of 650,572,000 lb. for January 1 in 1936–1940.

LARD IN STORAGE, January 1, 1941, was 286,773,000 lb., compared to 162,105,000 lb. a year before and to an average in 1936–1940 of 104,349,000 lb. for the date.

WEEKLY INDEX of wholesale food prices of Dun & Bradstreet stood at $2.50 on January 9, 1941, up from $2.35 for the corresponding week in 1940.

Commodity Prices Rise

UNABLE TO WITHSTAND the pressure of higher business levels, commodity prices finally broke through established levels and showed a definite increase during the month from December 21, 1940, to January 18, 1941. In that time, the *N. Y. Journal of Commerce* weekly index of general commodity prices increased from 81.6 to 83.3. This index stood at 81.8 on January 13, 1940. The same publication's weekly index of food prices rose from 68.1 on December 14, 1940, to 70.9 on January 11, 1941, while the grain price index rose from 66.2 on the earlier date to 68.1.

Among the other indexes that throw light on the situation are: Business activity index of *Business Week*, at 142.5 on January 11, compared to 143.0 a month previous and 123.6 a year before; U. S. Labor Department index of wholesale prices, up from 79.7 on December 14, 1940, to 80.2 on January 11, 1941, during which period the same agency's wholesale food index fell from 73.5 to 73.0 and the farm price index rose from 68.8 to 71.0. The index of retail costs of foods of the U. S. Department of Labor stood at 97.2 on December 17, 1940, compared to 95.9 a month earlier. The National Industrial Conference Board index of cost of living, which stood at 85.5 in November, rose to 85.8 in December.

Spot prices of food commodities showed the usual varied pattern of changes during the month from December 18, 1940, to January 18, 1941. Wheat, No. 2 dark winter, Kansas City, rose from 80½c. to 83c. Flour rose from $4.85 to $5.05. Corn, No. 3 yellow, Chicago, upped from 60c. to 63¾c. Among the meats, beef increased from 17½c. to 19c., lamb from 15c. to 17½c. and pork loins from 13c. to 18c. Lard jumped from $4.80 to $5.95.

In contrast, eggs dropped in price during this period, from 26c. to 19c. and butter fell from 34½c. to 30¾c. Among imported foods, sugar was steady at $2.93, coffee rose from 7¼c. to 7¾c. and cocoa fell from $5.38 to $5.25. Canned foods showed little change.

Construction News

	Pending (thousands)	Awarded January (thousands)	Total Awarded 1940 (thousands)
Bakery	$410	$2,200	$2,576
Beverages	320	481	7,844
Canning and Preserving	40	40	1,043
Cold Storage Plants	1,390	52	585
Confectionery	45	.....	570
Grain Mill Products	425	310	3,974
Ice Manufactured	.....	.....	271
Meats and Meat Products	50	148	2,817
Milk Products	425	85	2,051
Miscellaneous	340	314	7,146
	$3,445	$3,630	$28,877*

* Complete 1940 total.

Fats and Oils Prices Expected To Increase

IMPROVEMENTS in industrial activity and in consumer income are expected to be decisive factors in causing a moderate rise in the prices of edible oils and fats during 1941 and possibly 1942, according to the Bureau of Agricultural Economics. During this period, domestic production of oils and fats is not expected to change greatly.

Lard prices will likely increase relatively more than prices of other fats and oils because of curtailed supply following reduced hog marketings. Increased production of vegetable oils, and possibly of marine oils, should about compensate for decreased lard supplies, however.

In spite of this prospect, there is nothing alarming in the oils and fats price situation. While the general level of prices for these commodities was about 5 percent higher in 1940 than in 1939, it was still 36 percent below the 1924–1929 average. It is evident that a considerable price increase can occur in the next two years without oils and fats reaching any unusually high price levels.

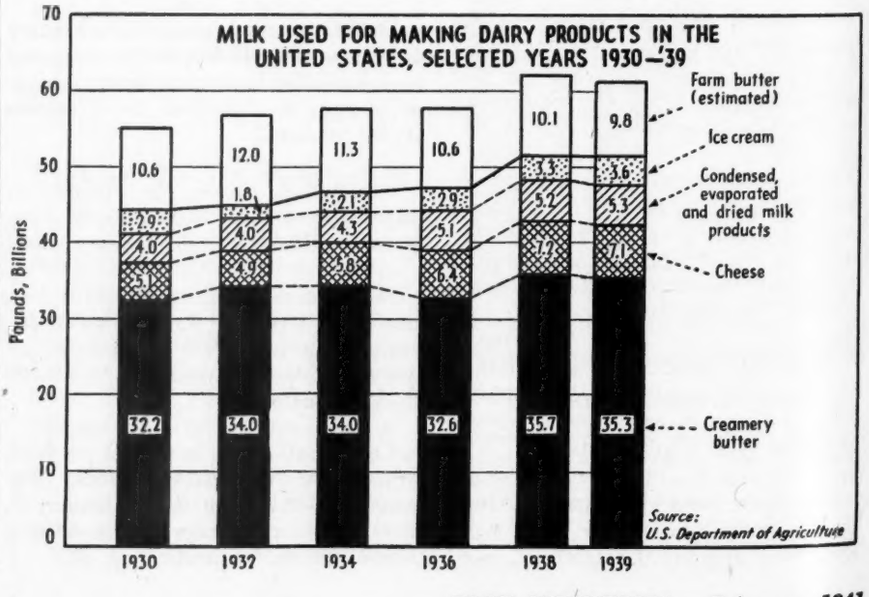
One deterrent to oils and fats prices going too high in the immediate future is the large stocks of lard in storage. The quantity on January 1, 1941, was 286,773,000 lb., considerably more than twice the quantity usual on hand at that date.

More Wheat in Sight

PRELIMINARY INDICATIONS for the production of winter wheat in 1941, according to the Crop Reporting Board, are 633,000,000 bushels. Assuming a normal spring wheat crop of around 200,000,000 bu., this output would give a total of some 830,000,000 bu., considerably above the 1940 crop.

As the supply on hand for the 1940–41 crop year is about 1.1 billion bushels, at least 400,000,000 bu. above consumption, the present prospect is for an even greater wheat supply in 1941–42, and for an increased carry-over on June 30, 1942.

Consideration of the corresponding wheat supply situation in other exporting countries indicates a more-than-ample surplus to supply the needs of hungry European countries, provided the war situation changes sufficiently to permit such action.



Processing Salt Stock

(*Continued from page 51*)

the equalization point, which in this case is 30 deg. Sal.

Because no more salt can now be removed by this brine, the tank is drained by the spigot. After draining, 750 lb. of fresh water is placed on the pickles in the tank. To this is added 14 oz. of powdered turmeric tied in a loose cheesecloth sack. Connect the steam siphon, heat the contents of the tank to 80 deg. F. (or, if the pickles undergoing process are shrivelled, heat to 90 deg. F.). Agitate with the paddle at least once every hour. In from 18 to 24 hours the brine test of the liquid in the tank should be between 18 and 24 deg. Sal. The process is now complete and the pickles are ready to be converted into sweets, sours or processed dills. If sours or dills are required they can be ready for use in 10 more days, or even less.

Where the pickler desires to use alum, it may be added in one of two places: (1) Just before turning off the steam after the second treatment add 15 lb. of powdered alum; or (2) when the pickles are placed in vinegar an equivalent amount of alum dissolved in the vinegar may be added.

(The only place where alum is needed is in pickles for shipment to the Tropics where 100 deg. F. temperatures prevail.)

Examples from Practice

First Process Water

Salt stock used..... 1,500 lb.
Test of salt stock..... 60 deg. Sal.
Desired equalization test... 30 deg. Sal.

Computations

$\frac{1,500 \times 60}{30}$ = 3,000 lb. of pickles and water required to effect the desired dilution

3,000 lb. − 1,500 lb. pickles = 1,500 lb. of water to add to the salt stock to effect 30 deg. Sal equilibrium

Second Process Water

Initial test (from first process water)..... = 30 deg. Sal.
Desired final test..... = 20 deg. Sal.

Computations

$\frac{1,500 \times 30}{20}$ = 2,250 lb. of pickles and water required to effect the desired dilution

2,250 − 1,500 lb. pickles = 750 lb. of water to be added for second process

Discussing Method of Computation

If one wished to be technical, it is possible to find fault with the foregoing method of computation of the proper amounts of water to add. For the basic assumption is that 1,500 lb. of 60-deg. Sal. salt stock still weighs 1,500 lb. after half the salt has been removed. Though there will be a slight difference, it should be borne in mind that following the same identical procedure in every tank, every day in the year, will produce uniform results. The basis of the method is the salt content of the salt stock in storage. If the needs of the sales department call for more or less salt in the finished pickles, the amount of water added to the second process may be modified accordingly.

But the foregoing uniformity is not the only advantage of this method of processing. It is possible to be sure that enough salt is left in the pickles to insure that they are sufficiently crisp and flavorsome—a condition not always attained by the older method.

Other vegetables preserved by salting may also be processed in the same equipment by the same methods, the only difference being the desired end point. Experience has shown that a final test of second process water should be between 15 and 22 deg. Sal.

Formula for Alum Solution

(To be used *after* processing)

Alum (iron-free).....4 lb.
Vinegar (100 grain).....1 gal.

Dissolve the alum in the vinegar. Heat to the boiling point. Use 16 fluid oz. to the 45-gal. barrel of pickles.

The alum is dissolved in vinegar instead of water to avoid diluting the vinegar on the pickles with water. Nevertheless, where there is no need to avoid such dilution the alum may be dissolved in the same quantity pure water as indicated in the formula, and used as indicated.

Labor Costs Low

Where the portable tank system of processing is employed the labor cost per 50-lb. bushel of salt stock is about $0.02. This amounts to $0.60 a tank.

To save the tedium and possible inaccuracies of repeated computation of the amount of water to add when working with different brine densities on the salt stock, the following table has been prepared. It will be observed that any variations in the original brine strength from the usual 60-deg. Sal. are compensated by appropriate variations of the amount of the first process water. This leaves the amount of the second process water always the same; namely, 750 lb. (See Table I.)

The arrangement of the table is a method of avoiding error by employees.

Part III will be published soon.—EDITORS

HACKNEY DRUMS . . .

Provide More Years of **EXTRA PROTECTION**

WHEN you know the construction and design features of Hackney Removable Head Drums, you'll understand why they last longer and assure full protection . . . why they're handled easier and faster.

The upper rim of a Hackney Drum is curled outwardly, making a smooth opening without inward projections. Complete emptying and drainage is easily accomplished. And the new, special Hackney welded chime construction (see cross-section below) provides a smooth surface which may be thoroughly cleaned without difficulty. Cracks and crevices are eliminated—there is no place for foreign matter to lodge.

A crescent-shaped, heavy steel hoop, tightened by a single bolt or the patented Hackney Toggle-tite closure, holds the head securely against the upper rim. To make the drum absolutely liquid tight, gaskets may be used between the head and chime. There is no possible chance of leakage either in or out.

Hundreds of shippers are now standardizing on Hackney Removable Head Drums—assuring themselves of Hackney advantages. Why don't you get all the facts? A Hackney engineer will gladly help you determine the most practical, economical container for your needs. Write today. There is no obligation.

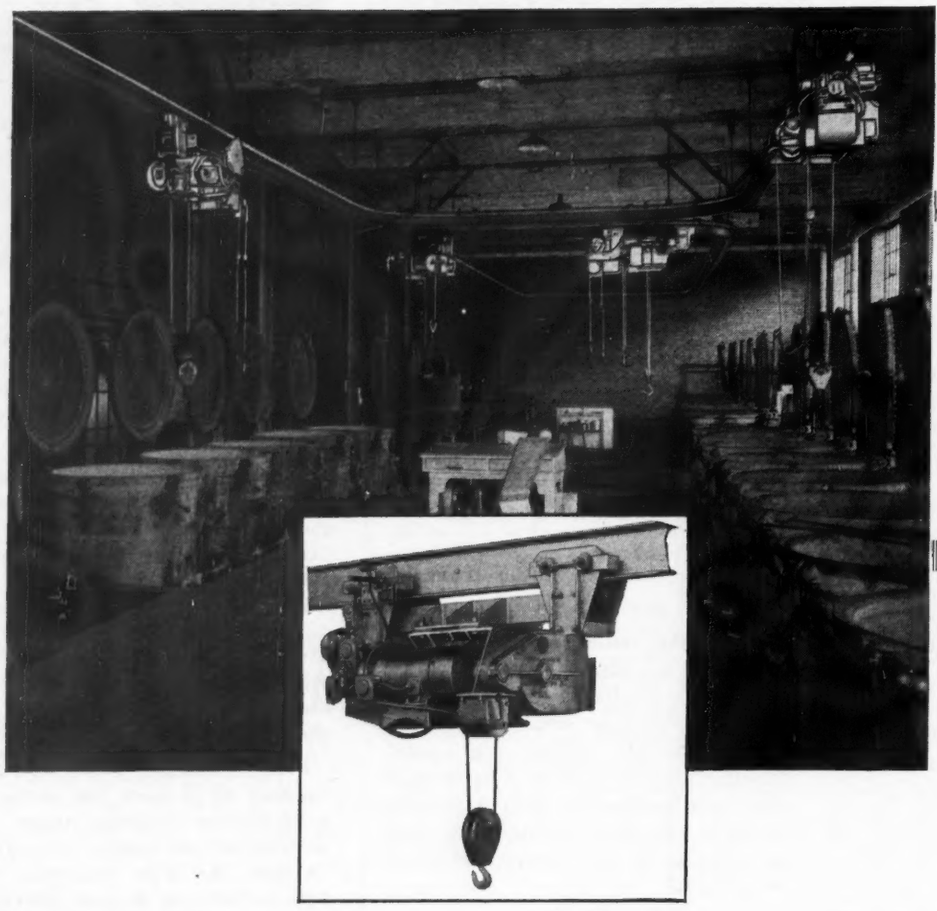
Hackney
MILWAUKEE

PRESSED STEEL TANK COMPANY

1349 Vanderbilt Concourse Bldg., New York
208 So. La Salle St., Room 1573, Chicago
669 Roosevelt Bldg., Los Angeles
1457 So. 66th St., Milwaukee

Containers for Gases, Liquids and Solids

Up Output... Lower Costs



Here's a battery of R & M Hoists keeping costs *down* from above in a modern food-processing plant. Each is equipped with electric motor drive controlled from the floor. Capacity is 1,000 lbs.; hoisting speed, 40 to 50 ft. per minute; and travel speed, 150 ft. per minute.

REDUCED handling and maintenance costs . . . stepped-up production . . . saving in plant space . . . trouble-free service. That's the performance record of R & M Hoists in food plants everywhere.

R & M offers many types of hoists—2,000 stock models—and quickly designs *special* jobs for unusual plant set-ups. All are built to quality standards that prompt plant engineers to counsel: "Better see what R & M has to offer first."

R & M Hoists combine power, speed, nimbleness and easy control, in a minimum of headroom space. They are equipped with R & M's own famous motors . . . are completely built and assembled in *one* plant, shipped ready to operate.

If there's a way to save *you* time and money and speed your production schedule, bank on R & M experts to find it. A phone call to your nearest Robbins & Myers office *now* may mean the saving of thousands of dollars. Or write our factory direct, and complete details on R & M Hoists adapted to your particular needs will reach you by return mail.

ROBBINS & MYERS • INC.

HOIST AND CRANE DIVISION • SPRINGFIELD, OHIO

Men, Jobs & Companies

INDUSTRY

Andes Candies, Inc., Chicago, has purchased the three-story former Cushman's Sons, Inc., bakery building to use as its main candy kitchen. The plant will be air-conditioned and modernized at a cost of $20,000.

Armour & Co., Chicago, has leased the William D. Carroll Packing Co.'s plant at Prarie du Chien, Wis., for a five-year period.

Cudahy Packing Co. has moved its canning operations from Kansas City to a new $400,000 sausage-making and meat-canning plant in Omaha, Neb. The building is 101x238 ft. and contains 100,000 sq.ft. of floor space. The Cudahy Co. also placed new laboratory facilities in service in January at a cost of $50,000 and has awarded contracts for construction of a $175,000 packing plant in Omaha.

Curtiss Candy Co. Chicago, has adopted group health and accident insurance for all employees, providing for benefits in event of disability, hospitalization and surgical operations.

P. Duff & Sons, Inc., Pittsburgh, will move soon into a new air-conditioned plant, equipped with modern machinery. The plant has ample railroad facilities and has wharfage facilities for river shipments of molasses from the South.

Falstaff Brewing Co. has completed a $150,000 expansion and improvement program at its plant in Omaha, Neb. New equipment includes glass-lined finishing tanks and automatic air-conditioning systems.

Geo. A. Hormel & Co. is constructing a one-story branch building in Birmingham, Ala., at a cost of $100,000. The building will be equipped with offices and with all facilities for the storage and distribution of packing house products.

Hunter Packing Co., East St. Louis, Ill., recently signed a contract guaranteeing minimum employment of 32 hours a week for the next year to 800 production employees. Wages were increased from 2 to 10 cents an hour, bringing the scale to 60 cents an hour in the minimum class and $1.14 an hour peak.

Kellogg Co. has begun a $1,000,000 modernization program in its power and processing plants at Battle Creek, Mich.

NORMAN C. SETTLE

McCormick & Co. Baltimore, has elected him a vice-president. Mr. Settle has been associated with the company since 1920, serving as vice-president and president of McCormick Warehouse Co., as plant manager and as personnel director for plant operations.

Kraft Cheese Co., Chicago, will complete construction of a new warehouse in Dallas by March 15. The building, 125x120 ft., includes offices, a refrigeration plant and housing and loading facilities for 15 trucks. Kraft recently leased approximately 5,000 sq.ft. of office space in Indianapolis to serve as production and sales headquarters for Indiana and Michigan.

Loose-Wiles Biscuit Co. has retained the services of Norman Bel Geddes & Co., Inc., to redesign its packages.

Louisiana Cane Products plans to build a $75,000 sirup plant in Abbeville, La.

National Association of Margarine Manufacturers has established headquarters in Chicago as National Margarine Institute.

Pacific Molasses Co. has awarded contracts for the construction of a $400,000 molasses storage plant at Ft. Lauderdale, Fla.

W. R. Roach Canning Co., a 39-year-old concern operating in five Michigan cities, has been granted permission to reorganize. In its petition for reorganization, assets were listed as $2,004,947.21 and liabilities as $2,632,780.60.

Sardik Food Products Corp., New York, has announced that "Sardik Cranberry Flakes" will be manufactured and distributed exclusively by Colley Cranberry Co., Plymouth, Mass., under its "Suits Us" brand.

Washington Beef & Produce Co. will

JAMES T. BISHOP

THEODORE SANDER, JR.

They have been appointed vice-presidents of American Maize-Products Co., New York. Mr. Bishop, vice-president in charge of development and research, has served as assistant to the president since 1934. Mr. Sander, financial vice-president, is associated with the Great Island Corp., representing the William Ziegler interests.

of the

VEGETABLE KINGDOM

Good old King Spud wears a crown of gold when you're the owner of a *Ferry Continuous Potato Chip Machine!* From a profit-making standpoint it has revolutionized the industry by automatically turning out from 45 to 350 pounds of top quality chips per hour, *every hour.* No undercooked, no burnt, no rancid chips as are unavoidable with the old expensive batch method.

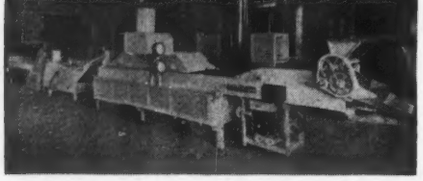
If you are in the potato chip business to make money get all the facts on this low-cost, high-performance machine. Write us today for Bulletin F. 9.

ALSO MAKERS OF:

JULIENNE, PRETZEL AND CAN WASHING MACHINERY

J. D. FERRY CO.

129 SO. CAMERON ST., HARRISBURG, PA.



Built in several capacities designed to fit your plant

build a $40,000 meat-packing plant and distribution center at Washington, D. C.

PERSONNEL

Paul Barry, Chicago, is president and treasurer of the reorganized Bleser Brewing Co., Manitowoc, Wis. Adolph Orth is vice president.

Wesley H. Childs, formerly chief chemist for Industrial Sugars Corp., has joined Nutrine Candy Co., Chicago, Ill.

Dr. John A. Clague, assistant professor of food technology at Massachusetts State College, Amherst, Mass., has resigned to accept a position as chemist in the research laboratory of National Canners Association, Washington, D. C.

Gilbert Gibson, formerly assistant chemist at Sidney Wanzer & Sons, has taken over quality control work for Dean Milk Co., Chemung, Ill.

N. P. Hull, Lansing, Mich., was reelected president of National Cooperative Milk Producers Federation for his eighth consecutive term at the recent annual meeting in Omaha.

Major Paul P. Logan has been transferred from the Army Industrial College and promoted in rank to the office of Lieutenant Colonel, Quartermaster Corps, Chief of the Subsistence Branch, Supply Division, office of the Quartermaster General.

Dr. Daniel Melnick has been appointed chief chemist of Food Research Laboratories, Long Island City, N. Y. Dr. Melnick was formerly engaged in vitamin research at the University of Michigan.

Howard E. Moore, head of Emmadine Farms, Inc., Beacon, N. Y., has been named president of Foremost Dairies, Inc., New York, succeeding Paul Reinhold, who has resigned.

James R. Nicholson, Jacob Ruppert Brewery, New York, has been appointed to the newly created position of assistant to the president, in charge of trade and public relations.

Thomas O'Neill has been advanced from sales manager to superintendent of Red Wing Co., Fredonia, N. Y. He succeeds Russell L. Trump, who lost his life in a hunting accident in Pennsylvania some time ago.

A. F. Perrin, formerly produce division manager, has been elected a vice-president of Cudahy Packing Co., Chicago.

A. E. Philips has taken office as president of White Rock Mineral Springs Co. In the past he has been associated with Tea Garden Products Co. and Welch Grape Juice Co.

H. B. Richie, Swift & Co. Research Laboratories, Chicago, left January 10 for Buenos Aires, Argentina, to do research work for Compania Swift Internacional.

S. O. Staake, Eau Claire, has been elected president of Wisconsin Milk Dealers Association, succeeding F. G. Blopp.

K. Strock, formerly of Sardik Food Products Corp., is now Lieut. K. Strock (SC) USNR, Receiving Ship USS Seattle, Navy Yard, New York.

A. F. Trebilcock, Madison, has been reelected president of the Wisconsin Association of Ice Cream Manufacturers.

PILLSBURY LOOKS TO THE FUTURE

Research and experimental work—the seeds of new products and processes—will be centralized in a modern new research laboratory established at Minneapolis by Pillsbury Flour Mills Co. The new research center includes chemical, bacteriological and biochemical laboratories, a dark room for photographic work, a refrigeration and freezing room, a utility workroom and offices. It is said to be one of the best equipped laboratories of its type in the industry. Above is shown part of the physical laboratory. The company will also maintain control laboratories at each of its mills.

DEATHS

David Allerdice, Sr., 53, vice president of Kingan & Co., Indianapolis meat packers, Jan. 10.

Oscar K. Bestgen, 62, president of Bestgen Chocolate Co., Jan. 11, at Cleveland.

Elmer S. Burnham, 87, founder and retired president of E. S. Burnham Packing Co., New York, Jan. 4, at East Orange, N. J.

Alva Cuddeback, 76, member of the board of directors and former vice president of Sheffield Farms Co., New York, Jan. 16. He had retired in 1937 after 50 years in the milk business.

John T. Cunningham, 76, founder and president of Cunningham Ice Cream Co., Chicago, Jan. 10, of heart disease. He was one of the founders and first president of National Association of Ice Cream Manufacturers.

George J. Cryst, 57, superintendent of the Mt. Morris, N. Y., plant of the Snider Packing Co., Jan. 1.

Harry C. Horton, 75, son of the founder of J. M. Horton Ice Cream Co., recently, in New York. He was a veteran of the ice cream industry and had served as president of Horton company.

Ralph Kemp, 49, Kemp Bros. Packing Co., Jan. 2, at Frankfort, Ind. He had served for many years on the board of directors and the administrative council of National Canners Association.

ASSOCIATED INDUSTRIES

Austin Co. has elected George A. Bryant of Cleveland as president and general manager to succeed the late W. J. Austin. Mr. Bryant has been executive vice-president and general manager since 1930.

Caterpillar Tractor Co., Peoria, Ill., has appointed D. A. Robinson vice-president and G. E. Spain, general sales manager. Henry M. Hale, eastern sales manager, has resigned to become an independent merchant of Caterpillar products.

Gaylord Container Corp., St. Louis, will construct a $600,000 factory at Oakland, Calif., as a part of its general expansion program.

General Electric Co., Schenectady, N. Y., has elected Harry L. Erlicher a vice-president. He had been purchasing agent since 1931 and an employee of the company for 40 years.

Mason-Neiland Regulator Co. has enlarged its quarters at Dorchester, Mass., to make available a larger area for assembly of the company's pressure, temperature, flow and combustion regulators.

I believe "Caterpillar" Diesels are the best for producing ice

MR. J. T. FRANKLIN, of West Helena, Ark., had a lot of things in mind when he came out so strongly for "Caterpillar" Diesel Engines. He was thinking about the service he gets from his "Caterpillar" Diesel . . . its operating economy . . . and its ease of operation. He says his engine kicks on almost as easy as an electric motor!

And Mr. Franklin was thinking how little fuel his "Caterpillar" Diesel D4400 Engine uses — only 1½ to 2 gallons an hour, at 4½c a gallon to produce 7½ tons of ice in a 24-hour day!

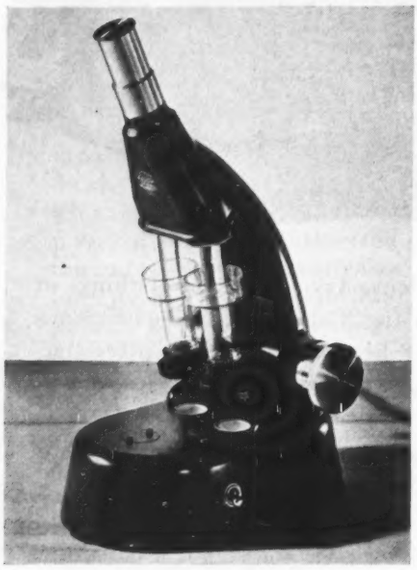
When you've got a "Caterpillar" Diesel, you've got a *cost-cutter* and *profit-booster!* Fuel, for instance, is not only used in small amounts — but it's low-priced, low-grade, non-premium Diesel fuel. You've got low maintenance-cost, too . . . through "Caterpillar" quality manufacture which includes "Hi-Electro" hardening for parts that have to fight the most wear: such as cylinder-liners and crankshaft. Many of these engines have run more than 20,000 hours, and are still giving low-cost, *money-saving* service! SEND FOR FREE LITERATURE.

CATERPILLAR DIESEL
REG. U.S. PAT. OFF.
ENGINES AND ELECTRIC SETS
CATERPILLAR TRACTOR CO., Dept. FI-2, Peoria, Illinois
Please send free information on "Caterpillar" Diesel Power. We require about _____ hp., or _____ kws.
Name _____
Street _____
City _____ State _____

Food Equipment News

Direct Result Colorimeter

SPENCER LENS CO., Buffalo, N. Y., has brought out a direct result colorimeter, an instrument said to be easier and more comfortable to use, and to provide a simplification of testing over previous designs. With this instrument, the per-



Direct result colorimeter.

cent concentration of any colored substance is read directly without need for tables or calculations. The depth of each solution is shown on a two part scale which reads units on the number ring and fractional parts on the drum. Each drum is fastened to its own pinion shaft, and the number ring is driven by a simple gearing.

With this instrument either side of the colorimeter may be used for the standards, since the scales on each side are identical. In operation, by setting the sample at 10, which corresponds to a depth of 40 mm., and then adjusting the depth of the standard in order to match the colors, the scale on the standard side when multiplied by 10 shows directly the percentage concentration of the sample. The scales are graduated in units from 0 to 14 and when used in this way the instrument has a range from 0 to 140 percent. Setting the sample depth to other values will, of course, extend the working range.

Another advantage claimed for this instrument is convenience in loading, with the cups directly in front.

Industrial Electric Truck

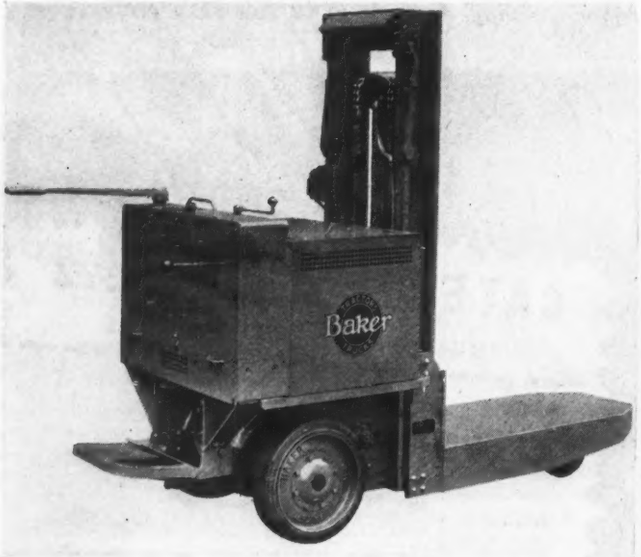
BAKER-RAULANG CO., 2168 W. 25th St., Cleveland, Ohio, has added a new truck, Type H–2, Series F, to its line of industrial trucks. This is a high-lift truck of 4,000 lb. capacity, designed for operation in narrow aisles and congested areas. Features of the truck as stated by the manufacturers include efficient hydraulic lift, light weight without sacrifice of strength, shorter overall length, accessibility of control, and absolute control of hoisting and lowering speeds. The standard lift is 60 in. and the standard telescoping lift is 119 in. The truck will operate in aisles 61 in. wide.

Fire-Fighting Trailer

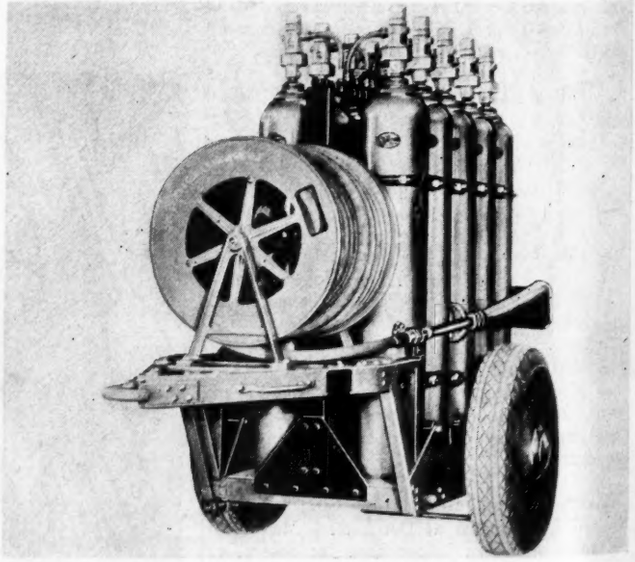
A LARGE CAPACITY carbon dioxide type fire extinguishing unit that can be attached to any truck or tractor has been developed by C–O–Two Fire Equipment Co., 10 Empire St., Newark, N. J., in 2- and 4-wheeled designs. As many as ten 50-lb. cylinders of compressed CO_2 gas can be carried in these units, which are equipped with one or two reels of 100, 150 or 200 ft. high pressure hose and discharge horns fitted with quick-opening valves. Pressure-operated valves are employed on the cylinders, by means of which the pressure of the discharging gas from the initially released control cylinders is used to discharge a portion or all of the cylinders simultaneously. The unit shown is 109¼ in. long and 48 in. wide.

Chain Belt Conveyor

CHAIN BELT CO., Milwaukee, Wis., has developed a new type of flat top chain



High-lift electric truck for use in narrow aisles.



Trailer type CO_2 fire extinguisher.

"What do you mean-it can't be done?"

For fifty-five years we have made a paper that can take so much punishment that people can still hardly believe it. It's called Patapar. Soak it in water as long as you will—it's strong as ever. Smear it with grease—it's resistant. Boil it—no failing. It stays unaffected, tasteless and odorless.

The food industry has long used Patapar in a big way. They wrap butter and cheese. They dress ham, bacon, frozen cuts, poultry in it. They use it for gaskets and milk bottle tops and in hundreds of ways.

They found that this is no ordinary material—Patapar stands up to jobs that seem impossible for paper.

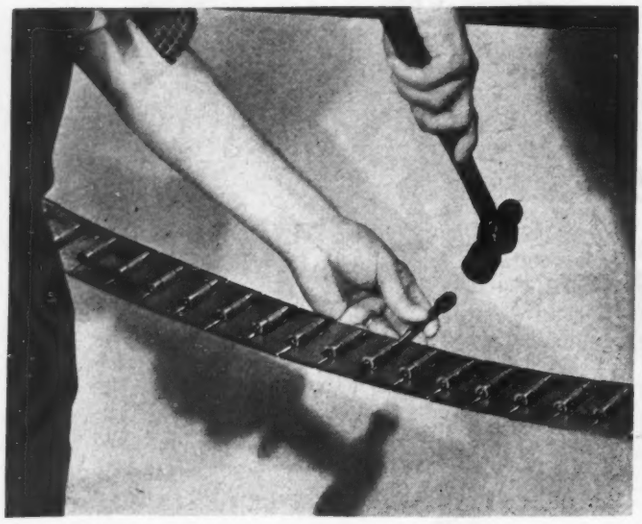
Does this inspire you also?

Perhaps the next use for Patapar will be something that none of us has thought of. *You* know more about your needs than we do. But *we* know about Patapar. So, if we ought to consult together, write us. We'll gladly send test sheets of the size, weight and finish recommended for your purpose.

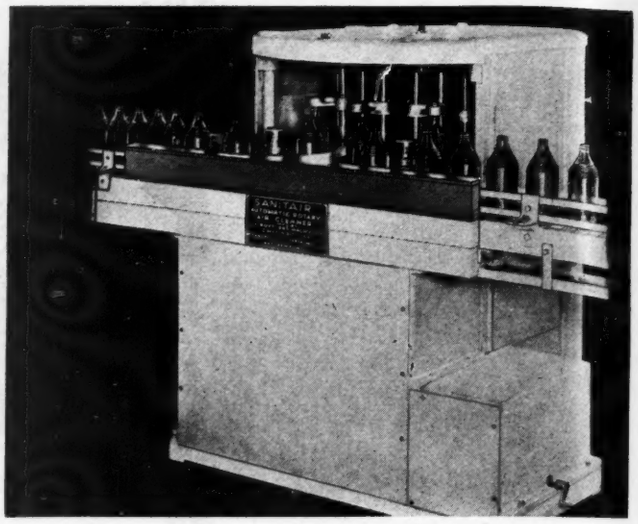
PATAPAR
REG. U.S. PAT. OFF.
Vegetable Parchment
INSOLUBLE · GREASE-RESISTING
ODORLESS · TASTELESS · BOIL-PROOF

PATERSON PARCHMENT PAPER COMPANY
Headquarters for Vegetable Parchment Since 1885
Bristol, Pennsylvania

West Coast Plant: 340 Bryant St., San Francisco, Cal.
Branch Offices: 120 Broadway, New York, N. Y.
111 W. Washington St., Chicago, Ill.



New type of flat top chain belt for conveyor service.



Automatic rotary machine for cleaning bottles and containers.

belt for conveyor service in food manufacturing plants. This chain, the construction of which is evident from the accompanying photograph, is said to provide more accurate pitch, smoother operation, higher resistance to corrosion and better appearance.

Known as Rex S-815 flat top chain belt, this belt has links formed from finish strip steel and assembled with pins upset at each end to prevent working loose. The one piece link and pin are the only parts. The flight is in one piece with the link and there are no attachment rivets to work loose. The top edges of the link are accurately beveled to allow smooth transfer of the containers from one link to another.

Links can be removed by driving out the pins, without any distortion to the link. All links are identical and no special coupler links are needed.

One of the advantages claimed for this chain in food plant work is the fact that there are no pockets formed in which foreign matter might collect. Cleaning can be readily accomplished by means of a jet of steam or water. The chain is designed to fit the same track as other flat-top chains, so that it can be used to replace them in existing machinery without adjustment.

Speed Variation Equipment

General Electric Co., Schenectady, N. Y., has brought out a standard unit for speed variations, operating from an a.c. source of supply to provide a wide range of adjustable speeds by means of the generator-voltage-control system. Each unit consists of an adjustable speed a.c. motor, an adjustable voltage motor-generator set with control, and a separately mounted generator rheostat. Standard speed ranges are available up to 16 to 1 ratio. The potentiometer type generator rheostat provides speed changes in small increments over a wide range.

Container Cleaning Machine

U. S. Bottlers Machinery Co., 4015 N. Rockwell St., Chicago, has brought out the "Sanitair," a fully automatic rotary machine for cleaning bottles and containers before filling. The machine is designed to handle a wide variety of styles and types of containers, with filling openings varying from the smallest AGST finish to the largest wide mouth fitting. Its purpose is particularly for removing lint, dust and dirt from new containers before filling.

In operation, a blast of compressed air at pressures from 50 to 90 lb. is used as a cleaning medium. Cleaning is accomplished in an inverted position so that foreign materials blasted from the inside of the containers are collected in an independent exhaust system. The direction of travel of the containers within the machine, the automatic feeding of containers, the inserting of the containers, the inserting of the cleaning tubes, the cleaning of the containers, the removal of the cleaning tubes, the righting and discharge of the containers, and the rotating of the complete working assembly of the machine is accomplished through the use of a continuous and constant motion in one direction. This is accomplished by employing double acting cleaning stations, which do away with the need for reversible cams and intermittent stop and go motion. As a result, it is said that longer life and smoother operation are obtained. The double acting feature makes possible double the cleaning time available on other rotary machines.

These machines are normally supplied with one set of attachments for the handling of one size container only, and without feed and discharge conveyor or conveyor drive. Additional attachments for handling a variety of types are available when desired. These attachments can be quickly and easily substituted one for another, the time of substitution requiring about ten minutes.

The whole device is designed for installation in any automatic production line.

Steam Trap of Large Capacity

Sarco Co., Inc., 183 Madison Ave., New York, N. Y., has brought out an indirect steam trap of very large capacity, suitable for pressures up to 175 lb. per sq. in. This consists of a standard inverted bucket steam trap of small size, coupled to a special diaphragm valve in the condensate discharge line.

In operation, the valve is normally closed. When condensate opens the discharge valve of the pilot trap, pressure reaches the large diaphragm of the main valve and opens it wide. It is held open as long as condensate flows, but shuts tightly as soon as the trap closes. This combination trap is available in sizes from ½ to 2½ in. It is known as Type BSDE.

Light-Weight Ladders

Aluminum Ladder Co., Tarentum, Pa., has recently developed double A type aluminum ladders of light weight for use in maintenance, cleaning and other industrial work. There are two types of these ladders, one for use in very narrow aisles. Both ladders have steps on each side. No. 900 is 36 in. high, has a top platform 12 x 15 in. and weighs 13 lb. Its feet are fitted with rubber pads for use on slippery floors. No. 901 is 4 ft. high,

equipped with casters and weighs but 40 lb.

Laboratory Water Still

F. J. STOKES MACHINE CO., 5850 Tabor Rd., Philadelphia, Pa., has announced six new electrically heated laboratory water stills in capacities of ½, 1 and 1½ gal. per hour. Each of these sizes is offered in two distinct types, one with standard immersion heaters and the other with heavy-duty heating elements that are protected against burn-out. These heavy-duty heating elements are provided particularly for use in hard water districts where scale tends to build up rapidly. They have a built-in thermal safety switch that cuts off the current in case the element overheats either from accumulation of scale or in case the water supply should fail. Expansion and contraction of the flat blades of these heating elements tend to crack aff the scale as it forms and the unit is thus partially self-cleaning.

Other features of the stills include Pyrex glass covers, readily removable for easy cleaning; solid tin condenser tubes; triple vapor baffles to prevent spray from contaminating distillate; heavy one-piece copper boiling chambers; automatic operation; gas eliminator to remove dissolved gases from feedwater; and a deconcentrator that automatically removes impurities that might cause foam or scale.

It is stated by the manufacturer that all stills in this new line will produce distilled water of exceptional purities well within strict U.S.P. requirements and the equal of that usually produced from either double or triple distillation; also that because of the efficient counter-flow principle of operation the cost of distillate is low, only about 4 cents per gallon, depending upon the local cost of electric current.

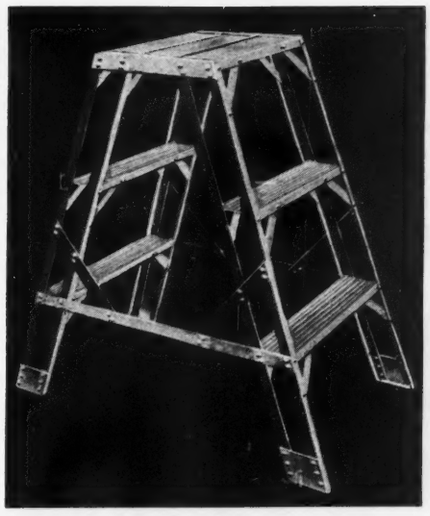
Iron Remover

FOR MAGNETICALLY REMOVING iron and steel particles, even as fine as 1/25,000 of an inch, from suspension in food liquids, S. E. Frantz Co., Inc., 161 Grand St., New York, N. Y., has developed the "FerroFilter." This device is a magnetic separator, not a true filter. It consists of a set of magnetized screens inclosed in a casing. The liquid is caused to flow through the screens, which present comparatively little resistance to flow. However, the magnetized edges of the screen mesh present thousands of feet of magnetized surface for removing iron or steel particles from the liquid.

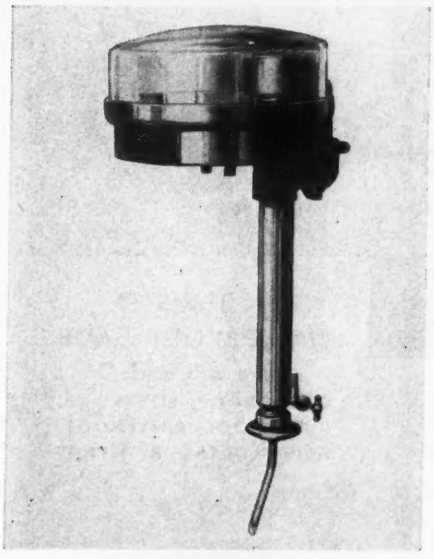
In operation, this device is inserted in the pipe line through which the treated liquid flows. To clean the filter, it is simply demagnetized and flushed out.

When this separator is used in food plants such as canning plants, it not only serves to remove metallic particles, but also acts as a simple filter for removing small pebbles, splinters, lint and other objects from the product being treated.

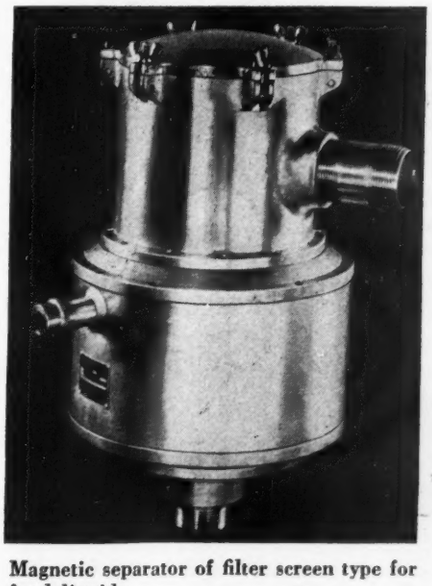
This separator is offered in both permanent magnet and temporary magnet types. It is available in a wide range of capacities and for various commonly used pipe sizes. It can be constructed of various metals, such as stainless steel or other alloys, to suit the products being treated.



Aluminum ladder of A type.



Electrically heated laboratory water still.



Magnetic separator of filter screen type for food liquids.

Correction

IN FOOD INDUSTRIES for January, 1941, on page 84, an item appeared referring to the No. 33 Thermalo roaster for shelled peanuts, manufactured by Jabez Burns & Sons, Inc., 11th Ave. and 43rd St., New York City. In this item, the capacity of the roaster was given as 500 lb. per hour of peanut butter stock. We are informed by the manufacturer that this roaster actually has a capacity of 1,000 lb. per hr. instead of the amount given. In other respects, the item referred to was correct.

Static-Free V-Belt

B. F. GOODRICH CO., Akron, Ohio, have announced a V-belt for machine drives which is said to prevent accumulation of static and to retain its static-discharging qualities throughout its service life. While this drive belt is of general interest it is said to be of particular importance for industries such as flour milling, where explosive dusts are encountered. Another feature of this belt is the absence of danger of its acting as a "short" between the motor and its operator. Just enough resistance is built into the belt so that it cannot act as a direct passage for current.

Photoelectric Relay

GENERAL ELECTRIC CO., Schenectady, N. Y., has recently brought out a photoelectric relay for such applications as counting, sorting, weighing, measuring, controlling, figuring, inspecting and regulating. This relay is housed in a cast alloy chassis with molded cover. It operates at speeds up to 150 interruptions per minute, and at a minimum of 40 foot-candles at the phototube with not more than 15 foot-candles of extraneous lighting present. The relay has a controlled contact rating of 10 amperes at 115 volts a.c., with two normally open and two normally closed contacts. The coil of the relay is energized when the light at the phototube is reduced below 30 foot-candles.

In designing this relay provision was

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ODORPROOF, SIFTPROOF, DUSTPROOF, LINTPROOF, ACID & GREASE RESISTANT

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made for many different types of mountings to accommodate the installation. The device has a removable bracket that can be secured to the supporting surface and the conduit, if used, before mounting the relay.

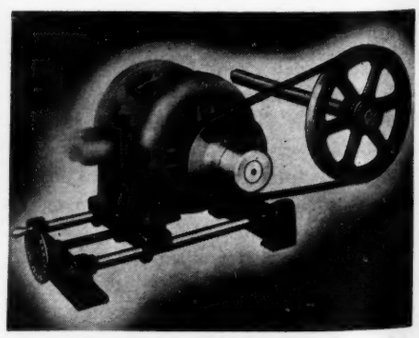
Container Sealers

A-B-C Mfg. Co., 242 South 4th St., Quincy, Ill., has brought out a new line of container sealers of automatic, semi-automatic and hand-operated types. High production speed, sound engineering design, and low first cost are the advantages claimed for these machines. The first units put out are handgluers of 26 in. capacity in all lengths, starting with a standard 6 ft. unit.

Small Variable Speed Control

Reeves Pulley Co., Columbus, Ind. has brought out the Vari-Speed Junior, a small variable speed control device. This unit is designed for controlling speeds of the smallest and lightest of machinery, operated by constant speed motors from fractional horsepowers up to 1½ hp. It comprises a disk assembly and adjustable motor base. The disk assembly consists of two cone-shaped disks, one stationary and one adjustable, a self-adjusting tension spring, a spring adjusting nut and a cover. This assembly is applied directly to the standard shaft extension of the motor, and the motor is mounted on the adjustable base. The V-belt, driving between the two disks and the shaft pulley on the driven shaft is a standard Section "A" or "B" belt that may be secured from any industrial supplier.

By use of an adjusting handwheel, the motor is moved forward and back on the base. When nearest to the driven sheave, the V-belt runs over the largest diameter on the disk and the maximum speed is assured. As the handwheel moves the motor away from the driven sheave, the V-belt runs over a smaller diameter and the speed is reduced. Minimum speed is attained when the

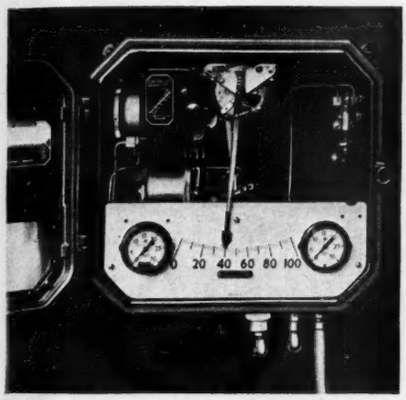


Small-size variable speed unit.

motor is farthest from the driven sheave. The unit is supplied in six different sizes of disk assemblies and provides speed control over a range from 1¾:1 to 2¾:1. Two sizes of motor base are available according to the size of motor.

Remote Control

FOR THE CORRELATION of temperature, pressure, flow or liquid level on a centralized panel or in a control room, Taylor Instrument Companies, Rochester, N. Y., has developed a remote pneumatic transmission system. This system



Remote pneumatic transmission system for control instruments.

utilizes standard control instruments. It may consist of one or two transmitters connected to a receiver; or one or more receiving instruments, not necessarily near each other, and as far as 1,000 ft. from the transmitter. Transmitters and receivers may be indicating, recording or controlling types. Air pressure is the transmitting medium, with ¼ in. outside diameter tubing as the means of connection.

When properly installed, this system is claimed to have an accuracy within ± 1 percent of the scale range. The speed of response of the receiver to changes in output air pressure from the transmitter is largely dependent upon distance, with a maximum lag of 1 second per 100 ft. of connecting tubing.

Cooling Unit

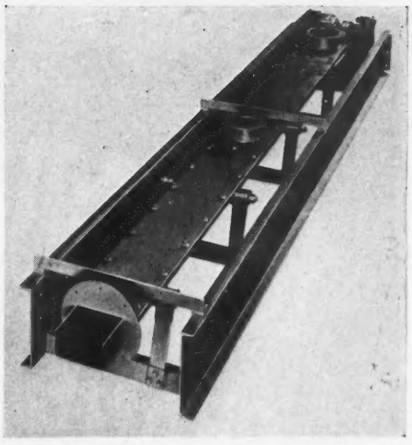
A FORCED air cooling unit designed primarily for product refrigeration but also adaptable to cooling has been developed by Carrier Corp., Syracuse, N. Y. Called the "Cold Diffusing Weathermaker," the unit is designed for control of refrigerating temperature, humidity and air circulation. It is offered in six sizes with capacities ranging from ¾ to 5 tons of refrigeration. Each unit includes a fan and motor, cooling coils, drip pan, two-way adjustable louver air grill, expansion valve and suction liquid refrigerant heat interchanger. The unit is designed for use with a Carrier refrigeration condenser unit. Six sizes are also available with cooling coil for "Freon 12", methylchloride or water, and four sizes with coils for ammonia or brine.

An advantage claimed for this equipment is the adjustable air grille which permits directional control and diffusion of the air. For special applications, the adjustable air grille is located at the discharge end of the elbow turn. Another advantage claimed is the built-in heat interchanger.

As a precaution against condensate dripping on the floor, all units are equipped with an oversized drip pan, an extended part of which catches any condensate dripping from external surfaces of the expansion valve.

Vibratory Conveyor

AJAX FLEXIBLE COUPLING CO., Westfield, N. Y., has brought out a vibrating type of conveyor featuring totally inclosed design. This conveyor has been designed to require minimum headroom and is equipped with a rubber-shackled pan



Vibratory conveyor.

mounting with self-contained drive.

Intakes are at the top and can be at one or more points as desired. The discharge is at the end. Flexible, dust-proof boots can be attached to both intake and discharge by means of flanges provided on the conveyor.

These conveyors are available in a variety of metals to suit the material being handled. Unit lengths of 50 ft. or more can be supplied, and for long distances the conveyors are installed in series. Widths up to 4 ft. are available.

★ For Defense!

FORTS, TOO, NEED A TROUBLE-FREE WATER SUPPLY—

YOU, who have already chosen Sterling Deep Well Pumps, will be happy to see this photograph of the first of four Sterlings being tested prior to permanent installation at Fort Benjamin Harrison.

YOU, who use Sterling Pumps, know that Sterlings destined for the U. S. Army passed the rigorous tests with "flying colors."

You will also be pleased to know that while Sterling Deep Well Pumps are being supplied for use by the Army, recent expansion plans have been completed that enable Sterling to take care of normal orders for pumps and service from private industry.

If you have water handling problems—write us today.

STERLING PUMP CORPORATION
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CRANE NO. 10 C Stainless Steel Sanitary Valves (PATENTED)

Operate extremely easily without leakage. Patented spring device lifts plug slightly when turned; eliminates galling and wear of plug and body. Keeps plug seated tightly. No internal pockets. Removal of two nuts permits dismantling of valve without disturbing plug lifting mechanism.

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Just off the Press

BOOKLETS · LITERATURE · BULLETINS

Food Plant Equipment

Blending Equipment
A new design of double cone blender, designed for eliminating waste of time and materials in the blending of foodstuffs, is described, with specifications in a 4-page bulletin issued by H. K. Porter Co., Inc., 4941 Harrison St., Pittsburgh, Pa.

Brewery Equipment
Glass-lined steel tanks, fermenters and yeast production equipment for the brewer are described and illustrated in a 32-page catalog issued by Pfaudler Co., Rochester, N. Y.

Filters
Construction information and application data on plate and frame filters for use in the food industries is given in Bulletin 110, issued by T. Shriver & Co., Harrison, N. J.

Materials Handling Equipment
Hand-operated lift trucks of the pallet type for both double-faced and single-faced pallets are described in Bulletin No. 117 issued by Lyon Iron Works, Greene, N. Y.

Materials Handling Equipment
In new General Catalog No. 90, a 372-page illustrated book, brief details of elevators, conveyors, chains, sprockets, crushers, and miscellaneous equipment are given by the C. O. Bartlett-Snow Co., Cleveland, Ohio.

Milk Drying Equipment
New models of Buflovak dryers for use in the production of dry milk are described in a 12-page illustrated bulletin, No. 327, issued by Buffalo Foundry & Machine Co., Buffalo, N. Y.

Process Equipment
The "Flow-Master" line including homogenizers, sanitary pumps, and a "Kombinator", a combination machine for grinding, mixing, blending, emulsifying, homogenizing and stabilizing, is described in an 8-page bulletin issued by Marco Co., Inc., 5325 Westminster Ave., Philadelphia, Pa.

Plant Supplies

Air Compressors
Improvements in the design of two-stage compressors, capacities from 350 to 10,000 cu.ft. per min., for pressures from 80 to 125 lb., are described in 30-page illustrated Bulletin 76, published by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.

Bearings
In Bulletin 740, description and specifications of Steelmaster ball bearings, Style A, extended inner ring type are given by Stephens-Adamson Manufacturing Co., Aurora, Ill.

Blowers
In Bulletin 21-B-35, Victor-Acme rotary blowers for handling small and medium volumes of air against pressure or under suction, ranging from 8 oz. to 7 lb. per sq. in., are described by Roots-Connersville Blower Corp., Connersville, Ind.

Capacitors
In a 20-page booklet, data for capacitor applications in industrial plant circuits, including theory, formulas, tables and parts, are given by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., under the title of Application Data 49-060.

Fans
Propeller-type fans of single, double and multi-blade design, are described with installation data in Catalog 12A issued by Hartzell Propeller Fan Co., Piqua, Ohio.

Fire Hose
Industrial fire hose for the protection of plants, together with fittings including swivel gaskets of Koroseal, are described in a 4-page bulletin issued by B. F. Goodrich Co., Akron, Ohio.

Magnetic Separator
The FerroFilter for magnetically removing iron particles from suspension in liquids is described in four-page illustrated Bulletin 15 of S. G. Frantz Co. Inc., 161 Grand St., New York, N. Y.

Motors
In Bulletin GEA-3434, 900 Series, Type TS 3-phase and Type QS 2-phase synchronous motors, in ratings from 20 hp. to 1,000 hp. and speeds from 1,800 r.p.m. to 514 r.p.m. are described by General Electric Co., Schenectady, N. Y.

Unit Heaters
In a four-page illustrated folder, a new line of gas fired unit heaters is described by Carrier Corp., Syracuse, N. Y.

Water Treatment
The "Mag-de-Sil", a process for the removal of magnesia and silica from boiler water is discussed in eight-page bulletin No. 2377 issued by the Permutit Co., 330 W. 42nd St., New York, N. Y.

Welding Information
In Bulletin T-2, technical information on the welding, brazing and soft soldering of nickel, Inconel and Monel is given by the International Nickel Co., Inc., 67 Wall St., New York, N. Y.

Control Equipment

Liquid Level Control
In Catalog No. 640, a 24-page illustrated bulletin, complete information is given on the Magnetrol liquid level control equipment and also on a line of boiler feed and condensate recovery systems. The publication is issued by Fred H. Schaub Engineering Co., 325 W. Huron St., Chicago, Ill.

Temperature and Humidity Equipment
Bulletin No. AC-129 is a 16-page illustrated catalog describing temperature and humidity control equipment, refrigeration equipment, heating equipment and air conditioning equipment of a variety of types manufactured by Carrier Corp., Syracuse, N. Y.

Laboratory Equipment

Laboratory Equipment
In Catalog D-184, a 28-page illustrated bulletin, accessories for use with Bausch & Lomb microscopes are described by Bausch & Lomb Optical Co., Rochester, N. Y.

Laboratory Equipment
The application of the fluorophotometer in fluorometric and colorimetric analysis of food materials is described in a publication of Pfaltz & Bauer, Inc., Empire State Bldg., New York City.

Miscellaneous

Construction Method
In two new bulletins, the use of the Lindsay Structure in the fabrication of industrial buildings, and in the making of housing, cabinets and casings, is described by Dry-Zero Corp., 222 N. Bank Drive, Chicago, Ill.

Defense Work
"Production for the Emergency . . . and After" is the title of a booklet presenting typical examples of available technics for defense production, employing such methods as the use of hygroscopic and non-hygroscopic products, rates and limits of chemical reactions to materials, physiological reactions for efficiency, health and production, and the animal assay, and biological or bacteriological reactions, published by Carrier Corp., Syracuse, N. Y.

Food Technology

NEW DISCOVERIES & INVENTIONS

FOOD TECHNOLOGY

Sterols From Oils

SHORT-PATH high-vacuum distillation of cod liver, tuna liver, corn and soybean oils yields sterols and natural antioxidants. The method is inherently inexact, giving only partial separation in a single pass. But by using pilot dyes of known volatility as aids in plotting elimination curves, and by measuring vapor pressures directly in a pendulum tensimeter, the sterols can be separated, accurately enough for commercial purposes, from the parent oils and from each other. Fish oils may contain as much as 2 percent of cholesterol, and vegetable oils are sometimes equally rich in sitosterol and stigmasterol. The sterols are useful in making vitamin preparations.

Under molecular vacuum distillation conditions the sterols collect at temperatures between 100 and 220 deg. C., with only occasional need for lower or higher temperatures. Crude high-vacuum distillation of mixed vegetable oils in commercial operation yielded 150 lb. of pale green oil containing sesquiterpenes and hydrocarbons, 900 lb. of pale yellow semisolid fatty acids and 240 lb. of crude sterols. Fractionation of the crude sterols gave 90 lb. sitosterol, 6 lb. stigmasterol and 100 lb. of a bland, odorless pale orange concentrate with good antioxidant potency. There is some evidence that other sterols are present in fatty oils, along with alcohols and esters not yet identified. Continued commercial application of short-path high-vacuum distillation may be expected to produce such compounds in usable quantities.

Digest from "High Vacuum Distillation of the Steroids," by K. C. D. Hickman, *Industrial and Engineering Chemistry* **32**, 1451, 1940.

Chloride Distribution In Vegetables

"PHOTOGRAPHS" showing the approximate distribution of chlorides in vegetable tissues can be obtained by an improved electrographic technic. The method comprises sensitizing gelatin paper with silver chromate and electrolyzing a section of tissue between two aluminum electrodes in such a way that one face of the tissue is in direct contact with the sensitized paper. Chloride ions migrating to the anode thus come in contact with silver chromate and form an image on the sensitized paper. Electrographs have been made in this way to show chloride distribution in celery, potato, carrot and cauliflower.

With certain modifications in the technic of preparing and electrolyzing the samples, the same principle can be applied to investigating chloride distribution in meat. Some preliminary experiments along this line were made with rat liver, heart and brain.

In the present investigation only chloride distribution was studied, but paper sensitized to other mineral constituents of vegetable or animal tissues could be employed for similar study. Here again some preliminary experiments were made, sufficient to indicate possibilities. Sodium distribution can be studied with zinc uranyl acetate as the sensitizing reagent. For potassium a suitable reagent is sodium cobaltinitrite. By proper choice of materials and reagents many facts about localized distributions of minerals in plant and animal tissues could be ascertained.

Digest from "Localization of Certain Chemical Constituents in Plant and Animal Tissues," by Herman Yagoda, *Industrial and Engineering Chemistry, Analytical Edition* **12**, 698, 1940.

FOOD ENGINEERING

New Laboratory Spray Dryer For Food Products

A LABORATORY SPRAY DRIER is described which has been particularly successful in preparing milk powder under controlled conditions and in drying such diverse products as egg yolk, blood corpuscles and grass juice. Whereas commercial dryers atomize the liquid under pressures as high as 3,000 or 4,000 lb. per square inch, much lower pressures are effective in small-scale operation. This drier obtains a fine mist with pressure of only 2 lb. per square inch applied both to the milk stream and the air jet. Incoming air is heated by twelve 600-watt elements, controlled in groups of three so that a wide range of air temperatures is available. Higher air-jet pressure gives a finer spray but builds up a back pressure which makes the liquid flow slower. The powder falling to the bottom of the drier is collected on a revolving glass plate passing under a stationary scraper arm. A metal-gauze air filter collects powder particles entrained with the outgoing air. Precondensing lowers the solubility of the dried milk slightly, but the improvement is too small to compensate for the much lower rate of powder recovery from precondensed milk.

The principal sources of powder loss are attributable largely to one cause, namely the wide range of globule sizes in the spray. Very fine globules yield such fine powder that the air filter does not prevent its escape with outgoing air. Large globules are not fully dried when they reach the base plate and spread over the plate as a film. The smallest available jet is too fine for practical use since much of its powder passes the air filter.

Digest from "Laboratory Spray Drying Machine," by R. Waite, *Chemistry & Industry* **59**, 659, 1940 (Published in England).

For Better Heat Transfer In Refrigeration

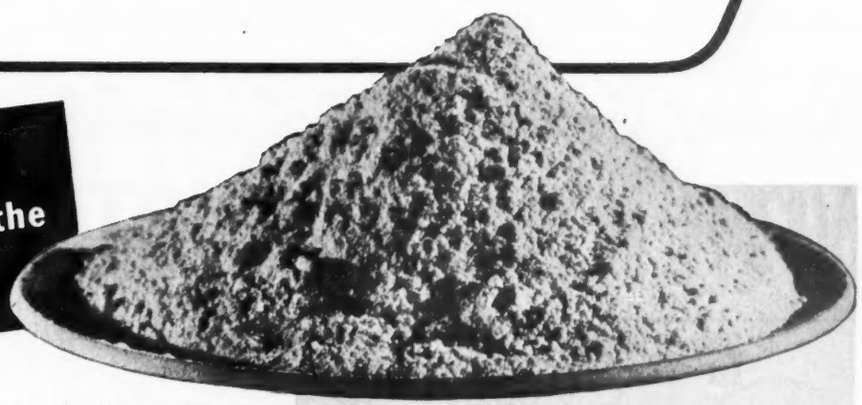
USEFUL HEAT TRANSFER effects can be obtained in refrigeration systems by means of a highly volatile liquid in a sealed cycle without using forced circulation.

One use is for transferring heat to ice bunkers such as the end bunkers in refrigerator cars. The volatile substance may be liquid ammonia, which has favorable properties and is cheap. Between 20 and 30 deg. F. its vapor pressure rises about 1 lb. per square inch for each degree of temperature rise, thus giving adequate circulation pressure even when the temperature gradient is small.

In refrigerating with water ice such a system serves to smooth out temperature fluctuations. Air temperature in refrigerator cars may be as low as 28 deg. F. near the bottom of the bunker (when

NOW!... A More Economical Source of Riboflavin (Vitamin G)

Also contains other members of the Vitamin B Complex



Solvamin is a rich, natural source of riboflavin synthesized biochemically by a new process developed by Commercial Solvents.

Since its discovery a few years ago, riboflavin (Vitamin B_2 or G) has assumed a rapidly increasing importance in human nutrition. Now, Commercial Solvents has developed a new process for the biochemical production of riboflavin. This process makes it possible to furnish practically unlimited quantities of riboflavin at a cost that permits its widespread use.

The new product, sold under the trade name of Solvamin, is a rich source of riboflavin—containing over 4500 micrograms of the vitamin per gram. In addition, Solvamin contains important amounts of other members of the Vitamin B complex, particularly pantothenic acid.

Solvamin is finding widespread use in the restoration of riboflavin to flour and in the addition of this vitamin to cereals and other foods. Have you considered the possibilities of Solvamin in *your* products?

A request on your letterhead will bring a sample and detailed information

COMMERCIAL SOLVENTS CORPORATION U.S.A.

COMMERCIAL SOLVENTS *Corporation*

17 EAST 42nd STREET, NEW YORK, N. Y.

SOLVAMIN

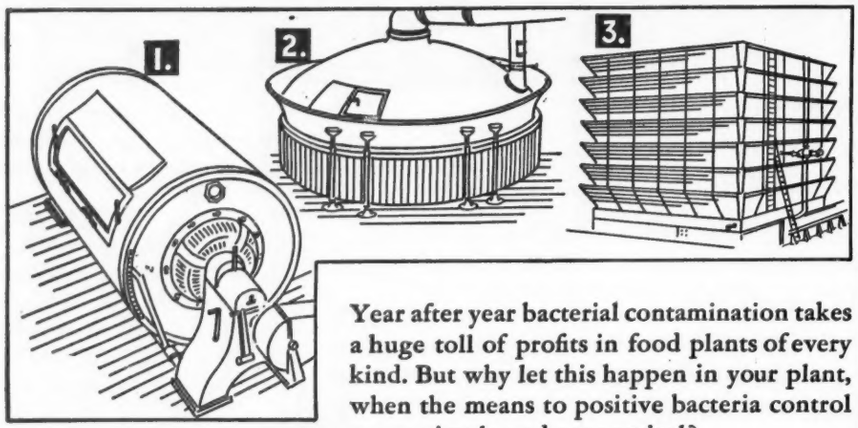
Rich in Riboflavin

salt is added to the ice) and as high as 50 deg. F. near the middle of the car under the ceiling. Such differences are more or less equalized by suitably spaced liquid ammonia pipes. Temperature control can be had by inserting a thermostat in the gas circulating part of the cycle, with a device for throttling or shutting off the flow of vapor. The ice can then be kept in a well-insulated bunker to avoid loss by excessive melting. The system can also be adapted to temperature control in refrigerating with dry ice, which gives harmfully low temperatures if not controlled. Where power for mechanical refrigeration is lacking, a pressure-operated control of this kind is useful. Aside from its potential uses in refrigerator cars, the system should be helpful, for example, in rural egg grading and packing stations.

Digest from "A Fluid System for Transferring Heat Over Small Temperature Gradients Without Forced Circulation," by W. H. Cook and T. A. Steeves, *Canadian Journal of Research* **18A**, 144, 1940; reprinted by the National Research Council of Canada as NRC No. 925.

Prevent Spoilage, Protect Quality

WITH HTH PRODUCTS



1. To prevent off-flavors and lowered quality in butter, it is essential to keep churns free from bacterial contamination. In addition to the regular thorough rinsing and cleansing, they should be treated before each use with a 200 p.p.m. solution made from HTH Products.

2. In breweries, HTH Products protect product quality by dependable sterilization of all utensils, pipe lines, filtermass, fermenters, bottles and bottle-fillers, etc.

3. Algae in condenser water causes slime in cooling towers, cuts down the efficiency of the refrigerating system. Ice plants use HTH Products to kill algae in cooling water, also to insure pure water for making ice.

Year after year bacterial contamination takes a huge toll of profits in food plants of every kind. But why let this happen in your plant, when the means to positive bacteria control are so simple and economical?

HTH Products*are chlorine sterilizers in convenient powder form, always full-strength and dependable in action. Added to water, they quickly make fast-killing hypochlorite solutions of the desired strengths for flushing, wiping or spraying all surfaces with which food products come in contact. And being in concentrated form, HTH Products are so economical to use that their positive germ-killing action can be applied throughout the entire plant.

Let HTH Products go to work in your plant now—help you prevent spoilage losses and protect the quality of your finished products. Send for literature and full information.

HTH PRODUCTS

THE MATHIESON ALKALI WORKS INC. 60 E. 42ND ST., NEW YORK, N. Y.

*HTH PRODUCTS HTH, HTH-15 and Lo-Bax . DRY ICE . LIQUID CARBON DIOXIDE . AMMONIA, ANHYDROUS and AQUA . CAUSTIC SODA . SODA ASH . BICARBONATE OF SODA . LIQUID CHLORINE . BLEACHING POWDER . PH PLUS FUSED ALKALI . GYPSUM PRODUCTS

CANNED & PRESERVED FOODS

Quality of Canned Sauerkraut

THE MAJOR FACTORS in the quality of canned sauerkraut may be listed as total acid, volatile acid, alcohol, vitamin C and salt content. Through these factors the color, odor, flavor, texture and nutritional quality are largely determined.

All these factors have been studied by analyses of 332 samples of canned kraut from sources representing a majority of the packers in the United States. With respect to total acid, the concentration reached by natural fermentation is often above 2 percent, leaving some margin for necessary dilution in canning without falling below the government standard of 1 percent acid calculated as lactic acid. A few high-grade samples contained slightly less than 1 percent acid, but low acidity more often accompanies low quality. Low acidity may result from faulty fermentation, but it is also a consequence of washing kraut to reduce off flavors. Volatile acid content is generally from 0.15 to 0.30 percent in good kraut but may be considerably higher or lower in low-grade products.

Alcohol content is not a reliable criterion of quality but when yeasts are allowed to develop during kraut fermentation more alcohol is produced and quality is impaired. Hence a high alcohol content is likely to indicate faulty fermentation.

The ideal vitamin C content in kraut is considered to be at least 0.15 milligram per gram. In general, a high-grade kraut, not diluted too much in canning, ranks well in vitamin C. About one-fourth of all the samples contained more than 0.23 mg. per gram.

Salt content is more directly and intimately related to kraut quality than any other single factor. More care in salting would give packers better results. Too many packers still rely on the salometer, an instrument which is entirely unreliable for determining salt content in such a complex, variable liquid as kraut juice. Too much salt inhibits the activity of desirable bacteria and permits pink yeasts to develop. The government standard is from 2 to 3 percent salt. As nearly as can be judged from the present series of tests, good quality kraut should contain from 1.5 to 2.5 percent salt. Only 3 of 23 samples with more than 2.5 percent salt rated good or better, and only 11 of 36 samples with less than 1.5 percent. The highest salt content in all samples rated good or better was 2.6 percent.

No single chemical test will serve to distinguish high-grade from low-grade kraut, because a good product may come outside the accepted limits with respect to some factor, while a poor product may show one or more tests well within the accepted range. Quality can be judged only by making a number of tests, and comparing results.

Digest from "Relation Between Quality and Chemical Composition of Canned Sauerkraut," by Carl S. Pederson, *Bulletin* No. 693, New York State Agricultural Experiment Station, Geneva, New York, 1940.

DAIRY PRODUCTS

Browning of Evaporated Milk

AUTOCLAVED evaporated milk takes on a brown color which has been variously attributed to caramelization of lactose and to reactions between lactose and milk proteins. The depth of color depends on time and temperature of autoclaving, lactose concentration and acidity. Lactose in the milk loses much of its optical activity, in direct proportion to the initial lactose concentration. Formaldehyde inhibits the color change but not the drop in optical activity. Caramelized lactose can be bleached with bromine. So can the brown protein precipitate which forms in autoclaved milk.

A detailed study of the chemical factors involved in browning indicates that color results from caramelization of lactose and not from reaction with casein. There is, however, a combination of lactose with caseinates in the milk, apparently by adsorption rather than actual chemical linkage of lactose to the amine groups in casein. Soluble phosphates can influence the color change, either diminishing or intensifying the brown tint according to whether phosphate dissolves in or is precipitated from the milk. But the natural phosphate concentration in milk is too low to have any perceptible effect.

Digest from "Browning in Autoclaved Milk," by J. P. Kass and L. S. Palmer, *Industrial and Engineering Chemistry*, 32, 1360, 1940.

Deaerated Milk And Bitter Flavor

FORMATION of bitter flavor in milk, due to acidity produced by lipase acting on the fat, is greater when the milk is deaerated. In other words, air or oxygen naturally dissolved in the milk tends to inactivate the lipase, the degree of inactivation increasing with the temperature. Dissolved copper (2 to 10 parts per million) also inactivates lipase in normal milk but has no effect in deaerated milk.

Digest from "Inactivation of Milk Lipase by Dissolved Oxygen," by V. N. Krutovsky and Paul F. Sharp, *Journal of Dairy Science* 23, 1119, 1940.

Salted Cream

THE ADDITION OF SALT to cream on the farm to preserve it until collected for butter manufacture is the subject of a public service patent by Williams of the United States Department of Agriculture. It is reported that the Food and Drug Administration views this as adulteration. Nevertheless, it works when salt at the rate of 10 to 13 percent of the serum is added on the farm immediately after separating. Later additions don't work, but such farm-treated cream will not become second grade in ten days at 60 to 70 deg. F. or in five days at 82 to 90 deg. F. Butter made from it will score two to five points higher than if salt were not used, and there will not be over 2½ percent salt in the butter. Salt in the cream keeps the acidity down, prevents protein decomposition, lowers bacterial count and alters the types of bacteria developing. Babcock testing of salted cream must be modified by diluting the cream in the test bottle with an equal amount of water and adding the acid in three installments, waiting ten minutes between the first and second and

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five minutes between the second and third.

Digest from "Effect of Salt on the Keeping Quality of Cream," by W. J. Caulfield, F. E. Nelson and W. H. Martin, *Journal of Dairy Science* 23, 1215, 1940.

Limburger From Pasteurized Milk

USE OF PASTEURIZED MILK in making Limburger cheese calls for some changes in procedure. Pasteurization makes a distinct improvement in the quality of the cheese if the raw milk is one poor in quality, such as the gassy milk often produced in midsummer. With high-grade raw milk, pasteurization does not improve cheese quality, but may increase yield and diminish loss of fat in the whey.

One of the principal differences in cheesemaking when pasteurized milk is used is in the use of starter. Sometimes excellent cheese can be produced without a starter, but under other conditions proper acid development may require addition of 0.05 or 0.1 percent of a lactic starter. It is preferable to do without starter if possible, aiming at approximately 46 percent moisture in the finished cheese. Cheese made with starter tends toward a drier curd, which results in body and texture more like brick than Limburger cheese. The cook must be properly controlled and the curd must not be allowed to cool rapidly while draining. With these precautions, and by holding the curd in the vat an hour or two longer than when starter is used, it is often possible to produce excellent cheese from pasteurized milk without adding lactic starter. Pasteurization of the milk promotes uniformity in cheese quality. It also retards acid development, but not so much as to result in defective cheese.

Digest from "Factors Affecting the Quality of Limburger Cheese Made From Pasteurized Milk," by M. W. Yale, *Technical Bulletin* No. 253, New York State Agricultural Experiment Station, Geneva, New York, 1940.

FROZEN FOODS

Frozen Poultry Storage

TESTS were made with frozen poultry in a special container of moistureproof material, capable of being ventilated during chilled storage and sealed during frozen storage. Such a package is needed to prevent surface drying of boxed birds, which is not prevented by jacketing off the coiling coils for the storage chamber. Particular tests for development of rancidity showed that prompt freezing after slaughter is urgent because delay favors ultimate deterioration with development of rancidity. Sanitation is also important, one reason being that bacterial growth with liberation of fatty acids ensues if conditions prior to freezing are not controlled to inhibit bacterial development. In the new moistureproof package there was good protection from surface drying and very little freezer burn. Such freezer burn as did occur was mainly in small areas which had been pressed against lightly waxed parts of the cartons. In these tests, when surface drying was prevented, rancidity was the first spoilage factor, but it was delayed until past the usual storage time, appearing in birds stored five to six weeks at 32 deg. F. and 27 weeks at 9.4 deg. F.

Digest from "Frozen Storage of Poultry: Further Observations on Surface Drying and Peroxide Oxygen Formation," by W. H. Cook and W. H. White, *Canadian Journal of Research* 18D, 363, 1940 (Published in Canada).

GRAIN PRODUCTS

Better Waste Disposal In Wet Milling of Corn

MILLING CORN after steeping in dilute sulphurous acid is a wet milling process throughout, all materials being handled as slurries after wet grinding. The stream pollution problem arising from waste disposal is so serious that in 1920, when byproduct recovery from effluents first received serious attention, the pollution load of the Corn Products plant at Argo was 250,000 to 400,000 population-equivalents per day. The first substantial improvement was effected by retaining process waters from starch washing and gluten settling, for recirculation and final concentration with the steep water in vacuum evaporators.

By 1928, the pollution load was down to 50,000 to 100,000 population-equivalents. But further progress was impeded by the difficulty of concentrating all wet-starch solubles with the steep water without excessive losses in evaporator efficiency and under fermentation of the low-temperature type. To overcome this difficulty, a high temperature fermentation process was developed for steep water. It prevents formation of volatiles, such as are liberated in low temperature fermentation, and gives a steep water which boils with maximum efficiency. By this expedient and by giving special attention to each individual source of process losses, the pollution load has been lowered to about 40,000 population-equiva-

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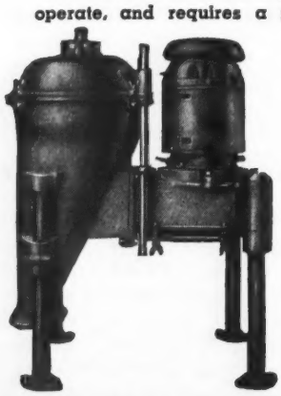

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lents, and there is a good prospect of bringing it still lower. Particular attention has been given to evaporation of corn sirup and sugar liquor, treatment of bone black wash waters and handling filtrates from chemically modified starch products. Byproduct recovery from processing effluents has more than justified the cost of the improvement program.

Digest from "Wet Milling of Corn: Recovery and Utilization of Process Losses," by A. L. Pulfrey, R. W. Kerr and H. R. Reintjes, *Industrial and Engineering Chemistry* 32, 1483, 1940.

FATS & OILS

Antioxidants in Soybean Oil

REFINED SOYBEAN OIL is more sensitive to oxidation than the raw oil. But if unsaponifiable matter which has been extracted from raw soybean oil is returned to the refined oil in the amount of 1 percent, the treated oil becomes more stable to oxidation than is the raw oil. To be effective the unsaponifiable matter must be protected from excessive heat and oxidation in its preparation. It retains its potency when dried in an atmosphere of nitrogen at temperatures below 140 deg. F., but its potency is nearly destroyed by drying in air at 221 deg. F. Irradiation of the unsaponifiable matter with ultraviolet light for 25 hours at 86 deg. F. causes a small weight loss (0.2 percent) but does not impair the antioxidant potency. Probably the principal components of the unsaponifiable fraction are sterols.

Digest from "Antioxygens of Fatty Oils," by Mitsuo Nakamura and Sakan Tomita, *Journal of the Society of Chemical Industry, Japan* 43, 271B, 1940 (Published in Japan).

Distearin for Margarine

WHEN FREE STEARIC ACID is directly esterified with glycerol the yield of monostearin is low (about 20 percent) even at high esterification temperatures, but the yield of distearin is much higher, for example, at 464-473 deg. F. than at 356 deg. Yields as high as 70 percent were obtained in 30 to 60 minutes at the high esterification temperature. When the same esterification conditions were applied to a commercial stearin, a product with a high proportion of distearin (as measured by solubility in 85 percent alcohol at 140 deg. F.) was obtained. This product was found to have exceptional emulsifying power, a property which makes it useful in the manufacture of products like margarine.

Digest from "Direct Esterification of Higher Fatty Acids With Glycerol," by Seiji Kawai and Hiroso Nobori, *Journal of the Society of Chemical Industry, Japan* 43, 170B, 1940 (Published in Japan).

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MEAT

Quality of Meat

PROPORTIONS OF muscle, fat and bone in meat animals are governed by the age of the animal and the nutrition plane on which it has been raised. Four nutrition planes are recognized, according to whether the animal was fed at a high or low level (for rapid or slow growth) in early life and in later life. The planes are therefore high-high, high-low, low-high and low-low. As an example, pigs fed at a high nutrition level in their first 16 weeks had 12 percent bone, 45 percent muscle and 30 percent fat, while similar pigs fed at a low level had 19 percent bone, 53 percent muscle and 10 percent fat.

Amount of connective tissue is often considered to be the main factor in tenderness, but probably the size of muscle fiber bundles is even more influential. Fiber bundle size increases with age and is greater in large than in small animals. Beef is therefore especially likely to be tough. Fattening makes meat tender because infiltration of fat into muscle makes the fiber bundles smaller. Beating and piercing with fine needles are helpful expedients.

Flavor and color of meat are closely associated, since color is imparted by hemoglobin. Flavor in beef, for example, ranges from pale baby beef, which is comparatively tasteless, to dark red bull beef which is sometimes too highly flavored to be palatable. The best flavor is found in bright red beef. Much used muscles contain more hemoglobin, hence are darker in color and stronger in flavor than little-used muscles. An example is the light breast meat and dark leg meat of fowl. Again, the hare yields darker and stronger meat than the comparatively less active rabbit. Color and consistency of fat are important factors in meat quality. Diet of the animal has much to do with quality as well as quantity of fat. Carbohydrate feeds give firmer, higher melting body fat than do fatty feeds.

Digest from "Some Factors Affecting Quality and Composition of Meat," by John Hammond, *Chemistry and Industry* **59**, 521, 1940 (Published in England).

Effect of Smoking on Tenderness of Canadian Bacon

TOUGHNESS of Canadian Wiltshire bacon, as measured by required cutting force, varies widely among the products of different packing plants. Samples from 22 Canadian plants were tested as factory-cured sides and after 5, 10, 20 and 40 hours of heating at 68, 104, 122, 140, 158 and 176 deg. F. One object was to ascertain the effects of smoking on tenderness.

In general, the first effect of heat is to toughen the meat, probably by simple moisture loss. As a rule, maximum toughness was observed in bacon heated at 122 deg. F., while heating at 140, 158 or 176 deg. F. had a definite tenderizing effect. Salt content, moisture content and time interval between curing and testing do not appear to be factors in toughness. Tenderness is influenced, however, by the acidity or alkalinity of pickle liquors. The reason for this influence is not certain since the meat itself varied only slightly in acidity and such small variations as were observed showed no apparent relation to toughness. It is interesting and perhaps significant that the pump pickle was slightly on the alkaline side and the cover pickle slightly on the acid side of neutrality.

Digest from "Canadian Wiltshire Bacon, XIII. Tenderness of Bacon and Effect of Heat Treatment on Tenderness," by C. A. Winkler and J. W. Hopkins, *Canadian Journal of Research* **18D**, 300, 1940; reprinted by National Research Council of Canada as NRC No. 933.

MISCELLANEOUS

Making Food From Grass

A PROTEIN concentrate which also contains carbohydrates can be prepared from grass or from other green leaf crops by a method disclosed in British Patent 511,525 (filed Aug. 21, 1939, by R. E. Slade and J. H. Birkinshaw, assignors to Imperial Chemical Industries, Ltd., Hexagon House, London). The procedure is to pulp the green grass or leaves in water, filter the pulp through a coarse filter to remove most of the fiber, and acidify the resulting plasma. The product has a high protein content.

Calcium Hardening for Potatoes

"THE SLOUGHING of pared, boiled potatoes was shown to be related to the rate of solution in hot water of the pectinous material in the tissue. Sloughing in potatoes with high sloughing tendencies can be controlled by the addition of sufficient calcium ion to the water in which the potatoes are boiled to keep the pectin in an insoluble form. If one-eighth of one percent salinity required in the cooking water to impart the proper flavor to the boiled potatoes is due to the presence of a suitable calcium, sloughing is no longer troublesome."

Quotation from 53rd annual report, Colorado Experiment Station, Fort Collins, Colo. Page 29.

Home Grown Flavors

(*Continued from page 39*)

of the crops to reach a stage where the oils can be extracted. So, even if larger plantings are made this spring, little immediate relief of some shortages can be expected.

Anise comes chiefly from Kwangsi Province in China, says Mr. Wesemann. This area is not occupied by Japanese, but prospects for supplies are unknown. However, as far as soil and climate are concerned, anise can be grown from Mississippi to southern Ohio, and can be produced in four months, according to men who have made experimental plantings of several flavor plants no longer coming from abroad. We have been using around 1,000,000 lb. of anise seed a year.

Licorice no longer comes from Russia and Asia Minor, and we have been using around 70,000,000 lb. of this root per year. However, E. H. Scofield, P. J. Kolachov and H. F. Willkie, of the National Farm Chemurgic Council, writing in the 1940 *Seagram's Bulletin*, tell of experimental plantings of licorice in southern California. They declare that it could be profitably grown there and also in Virginia, Mississippi and Texas. In contrast, U.S.D.A. Farmers Bulletin No. 663 questions the possibility of profit from growing licorice in the United States.

The same three men also report experimental plantings of coriander, no longer coming in from the Mediterranean countries. They believe, in view of increasing demand, that coriander would make a profitable small crop for American farmers. So far as the flavor industries know, though, no such plantings are being attempted on a commercial scale.

Finally, maple and honey are native flavors, amply abundant, and even the small amount of rose extract that is used, formerly brought in from Bulgaria and France, can be produced on our West coast. On the whole, the United States is not badly off for supplies of flavors, flavor bases and essential oils.

Industrial and Test Sieves

(*Continued from page 43*)

and would be equivalent to that obtained on a sieve with meshes *M*. The actual separation obtained is as represented in Fig. 3*c*.

In conclusion, attention should be drawn to the fact that this method of sieve comparison can be carried out equally well with diagrams of granulation recording the percentage of "oversize" instead of the "throughs."

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Books

Grape-products Situation

GRAPES, RAISINS AND WINES. (Report No. 134, Second Series, U. S. Tariff Commission, Washington, D. C., 1939.) 408 pages; 5¾x9¼ in.; paper. Price, 60 cents; for sale by Superintendent of Documents, Washington, D. C.

Changes in the character of the import trade in table grapes, overproduction in the raisin industry, and the success of the commercial wine industry since Repeal are major factors in this survey of the grape-products industries.

Part I of the report gives a summary analysis of U.S. tariffis on grape products, discusses problems of American grape growers as compared with those of foreign producers and examines government aid. Parts II, III and IV break down the grape industry into an analysis of world trade in table grapes, the competitive situation in raisin and current industries, and the expanding market for wines and brandies.

Most serious consideration is the recurrent overproduction of rasin grapes from vineyards which greatly increased production in Prohibition years to meet demand for juice grapes. Rapid developments in the U.S. grape industry through geographical concentration, large-scale production, and new marketing and transportation facilities have created a domestic surplus far beyond the limits of home consumption and shrinking foreign outlets. This and other prevalent conditions in the trade are examined, with the aid of charts and statistics.

Men in the grape-products industries will find highlighted in this study problems which they must face and solve. And the report is a comprehensive picture of the supplies and markets of those industries.

Chemicals for Industry

CHEMICALS OF COMMERCE. By Foster Dee and Cornelia T. Snell. Published by D. Van Nostrand Co., Inc., 250 Fourth Av., New York, N. Y. 1940. 542 pages; 6x9 in.; cloth. Price, $5.

As the title suggests, only chemical substances widely available for commercial use are described in the volume. In this respect, and in the fact that more information is given about many of the chemicals, the book differs from a chemical dictionary.

The book is designed to give in brief, concise form, the salient facts concerning various classes of materials. Among the sections of particular interest to food technologists and engineers are those devoted to alkalies, alcohols, fats and fatty oils, natural plant products, extracts of natural products, essential oils, carbohydrates and proteins.

Information on Materials

MATERIALS HANDBOOK. By George S. Brady. Published by McGraw-Hill Book Co., 330 W. 42d St., New York, N. Y. 1940. 563 pages; 6¼x9¼ in.; cloth. Price, $5.

Materials used in industry are briefly described and their characteristics given. This information is useful to engineers and superintendents in the food industries who are concerned with structures and equipment. There is little in the book for the food technologist, as few organic materials are covered, and those that are are not treated from the viewpoint of their use in foods.

All About Stamp Plan

ECONOMIC ANALYSIS OF THE FOOD STAMP PLAN. (A Special Report of the Bureau of Agricultural Economics and the Surplus Marketing Administration, U. S. Department of Agriculture.) By N. L. Gold, A. C. Hoffman and F. V. Waugh, Washington, D. C. 1940. 98 pages, 8x10½ in.; paper. Price, 20 cents; for sale by Superintendent of Documents, Washington, D. C.

First written for guidance in the administration of the Food Stamp Plan, this report now acquaints the public with information on economic and other aspects of the plan.

A valuable part of the study is the preliminary findings of a survey of diets under the stamp plan that was made by the Bureau of Home Economics at the request of SMA. The objectives of the plan, its scope, definition of blue and orange stamp purchasing power, selection of commodities for the surplus list and national potentialities of the plan are given equal consideration.

The food stamp plan has become a big factor in the marketing of foods. This report will help you to understand it and evaluate its significance.

Domestic Essential Oils

THE DOMESTIC PRODUCTION OF ESSENTIAL OILS FROM AROMATIC PLANTS. Published by National Farm Chemurgic Council, 50 W. Broad St., Columbus, Ohio. 77 pages. Price $.50.

A compilation of research papers relating to problems in the agricultural production of essential oils from the cultivation of aromatic plants. This bulletin includes a recommended laboratory technic and a small bibliography.

Patents

Food Compositions in Particle Form Mixed With an Emulsion-like Dressing Made From a Hard Fat and an Aqueous Constituent With Condiments, Sealed Air-Tight in a Container, and Subjected to Heat Treatment at Elevated Temperatures—Albert Musher, New York, N. Y., to Musher Corp., Elizabeth, N. J. No. 2,217,698. Oct. 15, 1940.

Salad Dressing Substantially Free From Oil Made to Contain a Water Thickener of Normally Pasty Consistency and an Aeration Agent—Albert Musher, New York, N. Y., to Musher Corp., Elizabeth, N. J. No. 2,217,699. Oct. 15, 1940.

Frozen Confection Attached to Hand Holding Device by Use of Edible Adhesives—Albert Musher, New York, N. Y., to Musher Corp., Elizabeth, N. J. No. 2,217,700. Oct. 15, 1940.

Nut Butter Composition Made From Partially Defatted Nut Butter and a Gelatinized Water-thickening Ingredient—Albert Musher, New York, N. Y. to Musher Corp., Elizabeth, N. J. No. 2,217,701. Oct. 15, 1940.

Nuts in Shell Given Surface-film Coating of Wax Containing Finely Divided Iron Oxides—Thomas M. Rector, Morristown, and Arthur F. Stagmeier, Upper Montclair, N. J., to General Foods Corp., New York, N. Y. No. 2,217,815. Oct. 15, 1940.

Chocolate and Similar High-fat-containing Paste Refined in Texture by Passage Through Series of Multiple Rolls Superimposed Upon Each Other in a Vertical Plane—Allan Ashmead Tunley and John Currie Paterson, Peterborough, England, to Baker Perkins Co., Inc., Saginaw, Mich. No. 2,217,974. Oct. 15, 1940.

Starch Containing 30 to 50 Percent Moisture Treated With 0.05 to 0.15 Percent Hydrogen Peroxide and Heated to From 100 to 165 Deg. F. to Make it Substantially Free From Bacteria—Herman H. Schopmeyer and George E. Felton, Hammond, Ind., to American Maize-Products Co. No. 2,218,221. Oct. 15, 1940.

Yeast Growth Stimulated by Bringing Seed Yeast Into Intimate Contact With From 1 to 2 Percent of Cocoa Butter Peroxidic Derivative—Vaman R. Kokatnur, to Autoxygen, Inc., New York, N. Y. No. 2,218,336. Oct. 15, 1940.

Freestone Peaches Peeled by Subjection to Jet Flames for not More Than 15 Sec. Prior to Washing With Water and Subsequent Mechanical Treatment to Remove Skin—Herbert Edward Gray and Arvid Manual Erickson, to Barron-Gray Packing Co., San Jose, Calif. No. 2,218,466. Oct. 15, 1940.

Food Composition in Particle Form Mixed With Hard Fat, Liquid Oil and Aqueous Material, Sealed in an Airtight Container, Heat Sterilized and Agitated Until the Composition Congeals in a Relative Homogeneous Mass—Albert Musher, New York, N. Y., to Musher Corp,, Elizabeth, N. J. No. 2,218,475. Oct. 15, 1940.

Citrus Fruit Peel Gratings Dehydrated by Using Sugar to Take up Water Content—Eugene L. Jack, Davis, Calif., to Borden Co., New York, N. Y. No. 2,218,534. Oct. 22, 1940.

Vitamin A Preparation Consisting Essentially of a Gelatin Matrix Containing Dispersions of the Vitamin Bearing Liquid Completely Imprisoned, Molded Into a Dry Solid State—Harden F. Taylor, to Atlantic Coast Fisheries Co., New York, N. Y. No. 2,218,591. Oct. 22, 1940.

Vitamin A Preparation in Dry State Made to Consist of Vitamin-bearing Liquid Dispersed and Completely Imprisoned in Matrix Made From a Gelable Colloid and an Invert Sugar Plasticizer—Harden F. Taylor, to Atlantic Coast Fisheries Co., New York, N. Y. No. 2,218,592. Oct. 22, 1940.

Peanuts Roasted in Shell Given Outer Surface Coating of Casein Containing Coloring Matter—William W. Kelly, Cleveland, Ohio, and Richard Perry Tolle, Detroit, Mich. No. 2,218,713. Oct. 22, 1940.

Dry Citrus Fruit Peel Made to Have not More Than 15 Percent Moisture and at Least 50 Percent of Original Essential Oil Content—Robert Everett Webb and Washington Platt, Syracuse, N. Y., to Borden & Co., New York, N. Y. No. 2,219,026. Oct. 22, 1940.

Vegetable Oils Refined by a Continuous Process—Benjamin Clayton, Houston, Tex. No. 2,219,088. Oct. 22, 1940.

Frankfurters Rotated During Smoking—Hans Maass, Brooklyn, N. Y. No. 2,219,135. Oct. 22, 1940.

Soybeans in Finely Dispersed State Added to Starchy Material Mash at Cooking Temperature Between 90 and 100 Deg. C., Cooled to About 55 to 65 Deg. C., Added to Grain Malt and Held at a Mashing Temperature to Produce Fermentable Sugars From the Starch-containing Material—William K. McPherson and Leo M. Christensen, Atchison, Kan., to The Chemical Foundation, Inc. No. 2,219,368. Oct. 29, 1940.

Doughnuts Cooked in Machine Equipped With a Proofing Chamber Above Hot Grease Compartment — David Robert Bradshaw, Birmingham, Ala. No. 2,219,410. Oct. 29, 1940.

Pie Crust Dough Rimmed by Mechanical Means—Lloyd J. Harriss, Chicago, and Bernard Lambers, Oak Park, Ill., to Lloyd J. Harriss. No. 2,219,448. Oct. 29, 1940.

Dextrose Hydrate Crystallized From Solution in Motion With Reduction in Temperature—Charles James Copland, North Kansas City, Mo., to Corn Products Refining Co., New York, N. Y. No. 2,219,513. Oct. 29, 1940.

Foods Preserved by Impregnation in Sugar Solutions of Progressively Increasing Concentrations of Sugar While Subjected to Action of Electric Current Flowing Through Solutions—Berthold Gernhardt, San Francisco, Calif. No. 2,219,772. Oct. 29, 1940.

Dry Sweet Corn Prepared for Parching by Preliminary Soaking in Water Containing Caustic Soda and Heating to Approximately 170 to 180 Deg. F. for Removal of Skin—Albert F. Holloway and Robert Lee Goodin, Oakland, Calif., to Olin Mfg. Co., Oakland, Calif. No. 2,219,777. Oct. 29, 1940.

Vegetable Oils Refined by Treating for the Removal of Gum Content—Benjamin H. Thurman, Bronxville, N. Y., to Refining, Inc., Reno, Nevada. No. 2,219,968. Oct. 29, 1940.

Bread Wrapped in Machine Operating to Give a Folded End Seal—Israel C. Gellman to Gellman Mfg. Co., Rock Island, Ill. No. 2,220,367. Nov. 5, 1940.

Noodles Cut by Mechanical Means—Conrad Ambrette, to Consolidated Macaroni Machine Corp., Brooklyn, N. Y. No. 2,220,438. Nov. 5, 1940.

Hot Freshly Roasted Coffee Beans Run Into a Dry Quenching Chamber in the Presence of Moving Cool Air to Check Roast Immediately After Discharge From Roasting Chamber—Donald W. Adams and Richard L. Schuhmann, Louisville, Ky., to Coffee Electrost Corp. No. 2,220,749. Nov. 5, 1940.

Porous Organic Commodities Tempered to a Predetermined Moisture Content by Moistening, Subjecting to High Vacuum Followed by Steam Treatment at Less Than Atmospheric Pressures—John M. Baer, Chicago, Ill., to Guardite Corp. No. 2,220,880. Nov. 12, 1940.

Fruit Cleaned in a Continuous Manner by Mechanical Brushing—Charles A. Willard to Fruit Treating Corp., Orlando, Fla. No. 2,221,159. Nov. 12, 1940.

Food Frozen During Passage Through an Insulated Low-temperature Tunnel Equipped With a Moving Conveyor and a Refrigerating Surface Shaped to Desired Cross Section of the Product to be Frozen—Dean A. Pack, Battle Creek, Mich. No. 2,221,220. Nov. 12, 1940.

Eggs Given an Oil Coating and Precooled for Storage or Shipment—Harry A. Mulvany, Berkeley, Calif. No. 2,221,343. Nov. 12, 1940.

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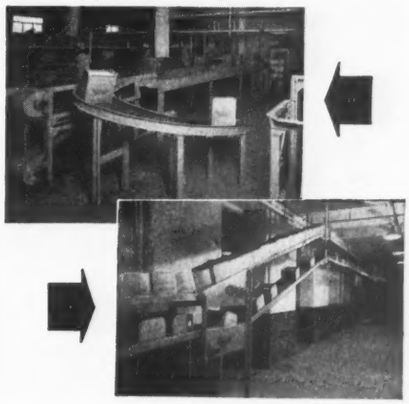

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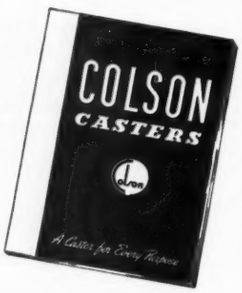

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the Center and Its Smooth Colored Translucent Coating—Jesse K. Farley, Jr., Evanston, Ill. No. 2,221,373. Nov. 12, 1940.

Glyceride Oils Stabilized and Given a Characteristic Flavor and Odor by Being Expressed From Dried, Low-moisture-containing Olive Paste—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,221,404. Nov. 12, 1940.

Water-alcohol-zein Solution Aged for Two to Three Hours at 20 Deg. C. Preliminary to Removal of Foreign Protein Impurities—Lloyd C. Swallen, Pekin, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,221,560. Nov. 12, 1940.

Alcoholic Zein Solution Stabilized by Cooling For Precipitation of Foreign Proteins—Lloyd C. Swallen, Argo, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,221,561. Nov. 12. 1940.

Fudge Powder Mix Made to Contain Ground Pregelatinized Starch—David John Young, Jr., Cliffside, N. J., to Corn Products Refining Co., New York, N. Y. No. 2,221,563. Nov. 12, 1940.

Dough or Grain Quality Tested by Mechanical Means—Adrianus Kleijn, Rotterdam, Netherlands. No. 2,221,640. Nov. 12, 1940.

Meat and Natural Casings Tenderized by Aspergillus Oryzae Enzymes—Lloyd B. Jensen, Chicago, Ill. No. 2,221,689. Nov. 12, 1940.

Honey Added to Salad Dressing Ingredients to Mask Corny and Mealy Flavor of Vegetable Oil Used—Walter F. Straub, to W. F. Straub & Co., Chicago, Ill. No. 2,221,957. Nov. 19, 1940.

Eggs and Fresh Fruit Preserved by Coating With Solid Emulsion of Lanoline and Mixture of Solid and Liquid Paraffins Containing an Ester of P-Hydroxy-Benzoic Acid—Erich Kurt Julius Schmidt, Munich, Germany. No. 2,222,000. Nov. 19, 1940.

Baked Products Frosted by Mechanical Means Manually Operated—Virgil E. Ackles, Los Angeles, Calif. No. 2,222,390. Nov. 19, 1940.

Popped Corn Given a Relatively Thin Coating of Cheese in a Carrier of Fat—Forest H. Clickner, Chicago, Ill., to Kraft Cheese Co. No. 2,222,560. Nov. 19, 1940.

Canadian Patents

Humidity Controlled in Refrigerated Spaces by Spraying the Cooling Surfaces With a Brine Which Prevents Moisture From Freezing on the Surfaces—Wm. H. Cook, to Honorary Advisory Council for Scientific and Industrial Research, Ottawa, Ontario. No. 392,615. Nov. 19, 1940.

Wet Starch Packed in Preformed Stiff Cartons and Heated to Convert the Starch to Crystalline Form—Wm. T. Gray, to St. Lawrence Starch Co., Ltd. No. 392,637. Nov. 19, 1940.

Foods Sensitive to UV Light Wrapped in Transparent Foils Containing a Nearly Colorless Bis(phenylolaminotriazyl)benzidine Disulphonic Acid to Screen out UV Rays—John Eggert and Bruno Wendt, Dessau, Germany. No. 392,680. Nov. 19, 1940.

Food Cooked in Separate Compartments in a Double-boiler Device Fitted for Individual Insertion or Removal of Cooker Compartments—Marguerite Lebouef, Outremont, Quebec. No. 392,859. Dec. 3. 1940.

Beer Cans and Food Tins Protectively Lined With an Alky Resin Priming Coat and a Pyroxylin Lacquer Top Coat—Percy M. Clark and Chas. B. Hemming, to Canadian Industries, Ltd., Montreal, Quebec. No. 392,880. Dec. 3, 1940.

Fruit Pitted in a Machine Having a Fruit-centering Plunger, a Stop Device Operating During Extraction of the Pit and an Extensible Pincer for Extracting the Pit—Giovanni Frova, Milan, Italy. No. 392,975. Dec. 3, 1940.

Residual Tannin in Decaffeinized Tea Rendered Tasteless and Odorless by Fixation With a Small Quantity of Formaldehyde, Gelatine or Aluminum Lactate—Theodor Grethe, Hamburg, Germany. No. 393,155. Dec. 10, 1940.

Pectin as Aid

(*Continued from page 56*)

Recommendations

Low-methoxyl, low-ash pectins are of definite value in the prefreezing treatment of strawberries.† With this fruit, pectin appears to function as a jellying agent, forming a jelly with exuding juices. Sugar may be added but is not necessary. This jelly prevented oxidation, further loss of juice and changes of color and flavor which accompany the loss of juice. It is recommended that strawberries be sliced before treatment with the pectin.

The use of pectin in the prefreezing treatment of peaches gave indefinite and contradictory results. It appears at this time that the low-methoxyl pectins are valuable for use with the white-fleshed, but of no value with the yellow-fleshed varieties. Pectins of high methoxyl content aid in the formation of viscous sirups when in combination with juice and sugar which cling to the exterior of the peach and thus prevent oxidation. The high-methoxyl pectins were found to be very valuable in the prefreezing treatment of Elberta peaches.

The use of pectin will be found beneficial in the prefreezing treatment of many fruits, but the results so far obtained indicate that the type of pectin will vary with the kind and even the variety of fruit.

† As the paper indicates, the amounts of low-methoxyl pectin required are small enough to warrant commercial trial upon strawberries. It would appear at the time of publication that specifications for pectins to be used in connection with the freezing of strawberries should include: (1) A methoxyl content of 5 percent, ± 1 percent. (2) Ease of water solution. (3) A relative viscosity (Ostwald or capillary) above 10 in 0.5 percent solution at pH 3 to 3.5. (4) A natural ash content of less than 4 percent. (5) No added buffer salts.

Europe Saves Tin

(*Continued from page 58*)

returnable container or its closure without special or general authority from the Minister of Supply—this doesn't apply, however, to trades people who have such containers on a loan basis from the packer or distributor.

By these orders, the Minister of Supply hopes to save 50,000 tons of tinplate and sheet steel annually for diversion to armament production.

England, of course, isn't the only belligerent which is strictly rationing tin, although its problems in the economic sense, regarding world supply and other factors, most nearly parallel our own.

Germany Substitutes

The American Consulate General at Frankfort-on-Main reports that loss of import tin has produced a critical situation for the German food canning industry. Except for reclaimed tin, the Nazis have virtually no supply now available. This has resulted in considerable reduction in production of canned foods. The Consulate General also reports that this situation, caused by the British blockade, holds true over most of continental Europe and that it is one of the most unfavorable aspects of Europe's economy. In Denmark, for instance, as well as elsewhere, there is danger of considerable loss of valuable food because of inability to pack available supplies in metal containers. This situation is aggravated, too, by abnormal increase in amounts of food available for packing caused by excessive slaughtering of livestock which, in turn, was necessitated by scarcity of fodder resulting from interrupted shipments of oilseed cake and other feeds.

Germany has resorted to various measures in her efforts to alleviate tin shortages—tighter restrictions on use, increased use of substitutes, intensified reclamation, wider use of other forms of packaging, and stimulation of frozen pack.

The Nazis have developed a new type of can made from black (untinned) plate, rendered corrosion-proof by interior coating with a film of phosphate applied by the Bonderizing process, followed by application of a coating of synthetic resin lacquer. These cans have been found usable for many food products, but they are not suitable for packing fruits and other acid-containing foods. The interior surface film has a poor resistance to the chemical action of the acid contents. More advanced research work has brought out a new type of tinless can developed from a steel sheet to which a corrosion-proof inner film is applied by electrochemical means. This can is claimed to overcome deficiencies of phosphate and lacquer-coated blackplate cans and to be suitable not only for fruits and acid foods, but also condensed milk, meat, sausage and vegetables.

Italy Follows Suit

Italy, too, has posted a long list of "don'ts" on the use of tin, particularly for non-food items, and has copied the English plan of requiring large-size cans for many foods. The General Italian Commissariat for War Manufactures has ordered complete substitution for tin in containers for petroleum products, shoe polish, floor wax, pharmaceutical products, cookies and sweets, meat-extract cubes and similar products, and such miscellaneous commodities as movie films, oil paints and tool parts. Substitutes required to be used are lead- or zinc-coated sheet steel or non-metal containers such as glass, waxed cardboard and ceramics. Tin also is banned in Italy for toy making.

The maximum can sizes in the orders are not too severe, but it is admitted that the initial regulations may become more stringent. Tomato paste, for instance, cannot be packed less than 200 grams to the container. Marmalades and pickles must be in containers of 500 grams or larger. Cans of meat must be packed in containers containing a minimum of 300 grams; sterilized milk, 410 grams; sweetened condensed milk, 385 grams; unsweetened condensed milk, 340 grams; and fish products, hors d'oeurves, salt meats, 100 grams (except tuna fish, 200 grams). Even where the minimum sizes apply, the emphasis, however, is placed upon those substitutes containing no tin.

Ideas for America

None of these courses necessarily is foreshadowed for the United States, whether we enter the war or stay out. But the path of restricted use of tin for cans is being marked out in other nations; these trails are available as guides if necessity gets the better of good intentions in this country.

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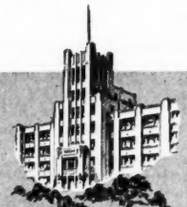

HOFFMANN-LA ROCHE, INC.
FAMOUS FOR PHARMACEUTICAL CHEMICALS

Formulas for Foods

FORMULA NO. 153

Chocolate Glacé

Sugar (granulated)	2 lb. 8 oz.
Corn sirup	12 oz.
Water	12 oz.

Stir together and heat to boiling. Boil 1 minute or until clear.

Chocolate liquor (chipped)	1 lb.
Shortening	12 oz.

Add these to the foregoing and stir until melted.

Sugar (4X)	3 lb.

Add sugar and beat until smooth.

It may be necessary to add some water at this point to give proper dipping consistency.

Use mixture warmed to 100 to 110 deg. F. for best results.

Formula from Parker-Broeg, Boston.

FORMULA NO. 154

Lemon Pie Filling

Water	6 lb.
Sugar (sucrose)	4 lb. 8 oz.
Lemon rind	2½ oz.
Salt	½ oz.

Bring to a good rolling boil.

Water (cold)	2 lb.
Corn starch	1 lb.

Suspend the starch in the water. Add this to the preceding boiling mixture and cook clear. Allow it to boil 3 to 5 minutes. Then remove from fire.

Egg yolks	1 lb.

Beat the yolks slightly, then stir into the boiled mixture.

Lemon juice	1 lb.

Now stir in the juice.

Sugar (sucrose)	1 lb.

Add the sugar last, mix smooth, then fill immediately into baked pastry shells.

Total weight of mix	16 lb. 11 oz.

Working Directions

Scale 1 lb. 6 oz. of filling to each 9-in. pie shell. Top with a good egg-white meringue. One dozen of 360 (to the crate) count lemons should yield approximately 1 lb. of juice and 4 oz. of rind.

When yolks are added to the boiled starch mixture after it is removed from the fire, the filling will be tender but firm, and it never gets rubbery.

Fill into the baked pie shells while still warm.

Formula from General Foods Sales Co.

FORMULA NO. 155

Mustard Sauce

Table mustard	20 lb.
Onions	2 lb.
Garlic	2 lb.
Sugar	20 lb.
Salt	7 lb.
Gum tragacanth	2 lb.
Mace, ground	4 oz.
Vinegar (24 grain)	25 gal.
Yellow color	as desired

Soak the gum in 2 gal. of water for 24 hours, and add 5 gal. of the vinegar, stirring well. Or else make a "mucilage" of the powdered gum and vinegar by means of a high-speed propeller-type mixer.

Soak the mustard and mace in 2 gal. of water for 24 hours. Peel and chop the onions and garlic.

Rub mustard and gum through a fine sieve.

Into a steam pan (steam-jacketed kettle) place all ingredients and boil gently for 15 minutes. Add yellow color. Pass batch through a fine sieve. Fill at a temperature higher than 180 deg. F. into container.

NOTE: Gum tragacanth may hydrolyze on long contact with boiling vinegar, hence it is advisable to minimize this effect by adding the gum as late in the process as possible.

Formula from H. B. Cronshaw, London, England. Republication rights reserved.

FORMULA NO. 156

Cream-type Icing

Hydrogenated shortening	3 lb. 2 oz.
Water	1 lb. 8 oz.
Sugar (powdered 4X)	12 lb. 8 oz.
Dry milk solids [1]	1 lb. 4 oz.
Salt	0 lb. 1 oz.
Flavor	to suit

[1] Not over 1½ percent fat content.

Blend fat and water at 75 deg. F. to form an emulsion. Sift sugar, milk solids and salt several times and add to emulsion gradually. Beat to desired lightness.

If chocolate flavor and color are desired, increase water content 2 oz. in fat and water emulsion and add from 12 to 16 oz. of natural or domestic cocoa to the dry ingredient mixture before sifting.

Formula from American Dry Milk Institute, Inc.

FORMULA NO. 157

Barbecue Sauce No. 2

(Laboratory formula)

Butter	120 gm.
Hot water	360 gm.
Vinegar	30 gm.
Salt	2 gm.
Black pepper	0.3 gm.
Red pepper	0.3 gm.
Paprika	0.5 gm.
Chili powder	0.5 gm.
Sugar	4.0 gm.
Prepared mustard	8.0 gm.
Worcestershire sauce	0.5 gm.
Tabasco sauce	0.3 gm.
Chopped onion	0.4 gm.
Garlic	0.1 gm.
Yield	526.9 gm.

Mix ingredients. Heat to boiling point. Remove garlic. Use for basting a broiling meat.

FORMULA NO. 158

Beef Steak Sauce

Tamarinds	30 lb.
Onions	4 lb.
Garlic	½ lb.
Sugar	10 lb.
Salt	5 lb.
Horseradish (shredded)	3 lb.
Mustard	3 lb.
Cayenne	8 oz.
Caramel	4 oz.
Soy sauce	5 gal.
Mushroom catchup	5 gal.
Malt vinegar (24 grain)	30 gal.

Working Directions

Remove seeds from tamarinds by simmering for 15 minutes in the vinegar and passing through the pulping machine.

Soak the ground spices in water for 48 hours. Peel and chop fine the garlic and onion. Make the mustard into a thin paste with water.

Place all ingredients thus prepared into a steam-jacketed kettle and simmer for one hour.

Formula from H. B. Cronshaw, London, England. Republication rights reserved.

(*Turn to page 102*)

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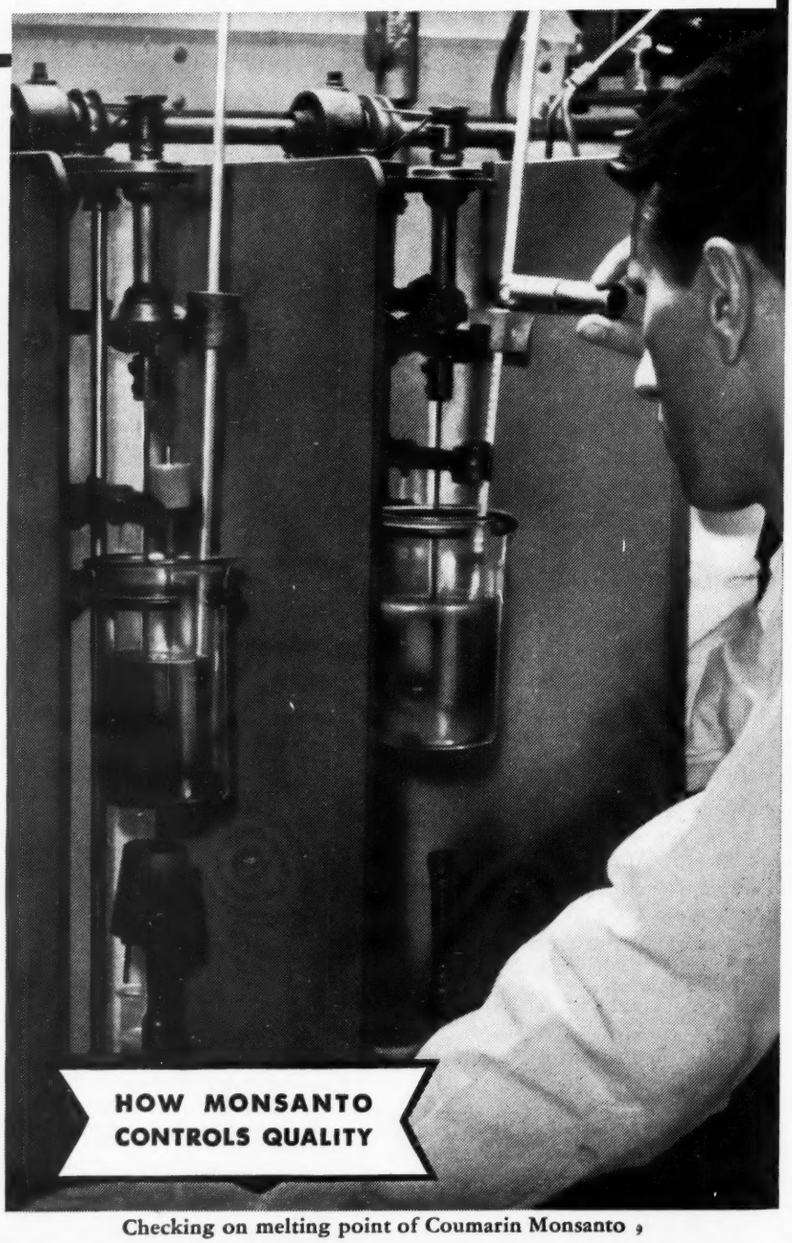

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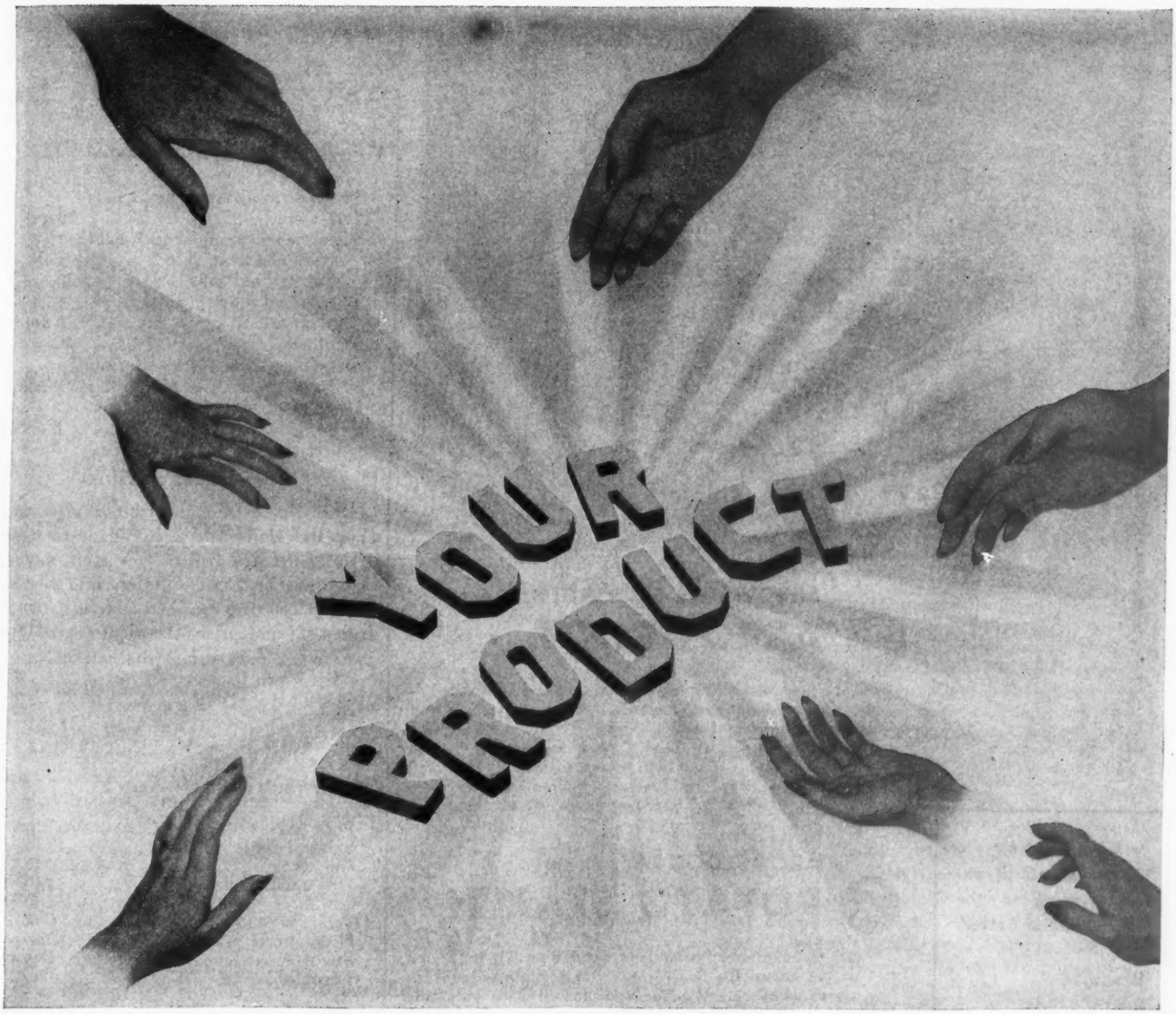

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Formulas

(*Continued from page 99*)

FORMULA NO. 159

Crushed Strawberries

Strawberries (cold packed 2 plus 1) 1 bbl	50 gal.
Sugar (sucrose) equal to weight of drained fruit	x lb.
Strawberry red color	8 oz.
Benzoate of soda (in 1 qt. water)	8 oz.
Corn sirup	2 gal.
Fruit acid	16 oz.
Strawberry juice drained from fruit	2 gal.
Genuine fruit extract, strawberry	8 oz.

Working Directions

Drain juice from the fruit. Weigh and chop the fruit. Add 1 lb. sugar to each 1 lb. of drained fruit. Place fruit, sugar, color and benzoate solution into kettle. Heat to 180 deg. F. Then add corn sirup, fruit acid and juice. Draw into a cooling pan. When cool stir in the extract.

Formula from David Algie.

FORMULA NO. 160

Braunschweiger No. 1

Pork livers	55 lb.
Skinned jowls	45 lb.
Onions	3 lb.
Dry milk solids	3½ lb.
Salt	3 lb.
White pepper	6 oz.
Ground celery seed	2 oz.
Sweet marjoram	1 oz.
Cardamom	1 oz.

Slash livers and soak in cold water for 2 hours. It is best to keep them in cooler while soaking. Place livers in silent cutter, add onions and dry milk. Chop fine, then add skinned jowls and spices. Chop all fine. Care must be taken not to get the mixture too warm while chopping.

Stuff in sewed hog bungs. After stuffing cook about 1½ to 2 hours at 160 deg. F. Chill quickly in ice water. When chilled, hang up to dry, then hang in smokehouse and give as cool a smoke as possible. When the desired color is obtained, take out and cool gradually.

See also General Directions (Formula No. 22).

Formula from Dry Milk Institute.

FORMULA NO. 161

Mint Pineapple

Crushed Pineapple (See Formula No. 19)	10 gal.
Green color solution	4½ oz.
Spearmint emulsion	2 oz.

Warm somewhat and mix.

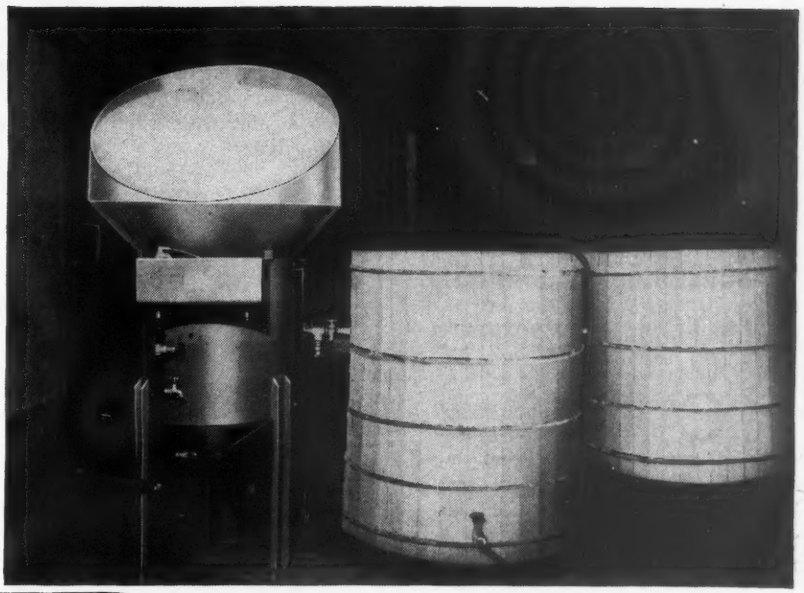
The green color solution is 4 oz.

★

In any process where you use salt in solution you can

improve quality and make real economies

☆



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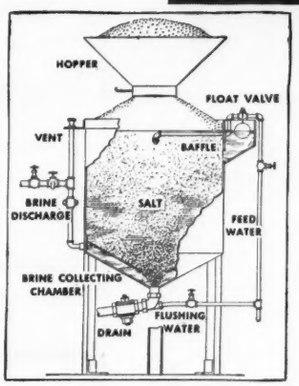

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2. **No labor or power cost for mixing brine.**
3. **No labor cost for distributing brine.**
4. **Savings in the amount of salt required, reported by users to be as much as 10% to 20%.**

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★ ★ ★

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The Lixate Process is a development of the Research Department of International Salt Company, Incorporated. International produces all types and grades of granulated (vacuum evaporated) salt; flake or grainer evaporated salt; and Rock Salt. The International Advisory Service places the benefit of International's long experience and thorough research at the service of salt users, without cost or obligation. You are invited to submit any problem concerning uses of salt or salt brine.

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Information about salt brine in The Lixate Book is valuable. For instance, International's copyrighted brine tables give all properties of brine—weight, specific gravity and many others—at various strengths. This ready reference should be on every food packing executive's desk. Write for a free copy today.

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FD&C Green No. 1 made up to 1 gal. with water.

Spearmint emulsion consists of 1 oz. oil spearmint and 1 oz. gum arabic made up to 1 pint with water while beating vigorously.

Formula from David Algie.

FORMULA NO. 162

Chocolate Cream Icing

Chocolate fudge base	4 lb.

(See Formula No. 52)

Amount is variable for color or flavor. Warm slightly and cream out smooth.

Hydrogenated shortening and butter	6 lb.

Add a little at a time, scrape bowl and cream light. Then add:

Salt	1 oz.
Vanilla concentrate	½ oz.
Sugar (4X)	6 lb.
Milk (powdered)	1 lb. 8 oz.

While beating on second speed, add gradually:

Water	3 lb.

Then add:

Sugar (4X)	14 lb.

Add last and mix smooth:

Water	1 lb.

Then add:

Sesame oil	8 oz.

Or some other tasteless oil (to help produce a shine).

Use as you would regular fudge frosting.

Formula from Parker-Broeg, Boston.

FORMULA NO. 163

Butter Cream Icing B

Butter	0 lb. 12 oz.
Hydrogenated shortening	3 lb. 0 oz.
Simple sirup [1]	11 lb. 0 oz.
Sugar (powdered 4X)	12 lb. 8 oz.
Dry milk solids [2]	3 lb. 12 oz.
Salt	to suit
Flavor	to suit

[1] Dissolve 2 lb. of granulated sugar in 1 lb. of water. Gentle heating will speed up solution.

[2] Not over 1½ percent fat content.

Blend fats well at 75 deg. F. Add simple sirup gradually and beat to make a light emulsion. Sift sugar and milk solids several times and add gradually. Beat smooth. Add salt and flavor while beating.

If chocolate flavor and color are desired, add 4 oz. of water to fats and sirup while creaming and mix in 28 to 32 oz. of natural or "domestic" cocoa during sifting of sugar and milk solids.

Formula from American Dry Milk Institute, Inc.

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There is an index to Raw Materials advertised in this issue on page 106.